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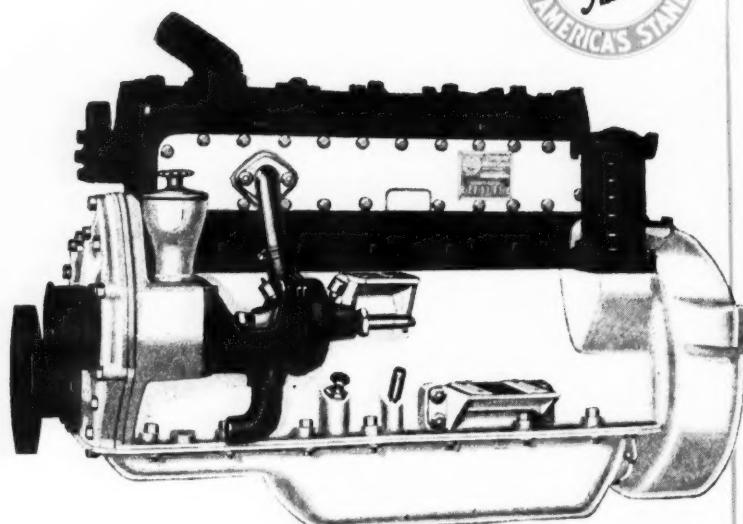
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AUTOMOTIVE INDUSTRIES

VOLUME 55

Philadelphia, Thursday, December 30, 1926

NUMBER 27

Export Gains Feature 1926 Truck Records

Overseas sales up more than 30 per cent above 1925 totals.

*Commercial vehicle output reaches new high levels
with domestic sales increasing gradually.*

By Norman G. Shidle

THE outlook in the motor truck industry for 1927 is favorable, although as in the passenger car field stability and gradual growth rather than rapid expansion seem likely to be the dominating factors in the coming year. A retrospective glance over 1926 reveals some specific facts which bear directly upon developments of the immediate future.

The high spot of the truck year has been the marked advances made in export markets, despite relatively slow gains in purely domestic sales. Study of detailed figures now available for all but the last few weeks of the year shows up the export progress clearly.

The total number of trucks built in United States and Canada in 1926 is nearly 9 per cent ahead of the 1925 record.

The gain in truck exports from United States and Canada, on the other hand, has been about 33 per cent in units and about 40 per cent in value over 1925.

All in all some 39,000 more commercial vehicles have been built and sold this year than in 1925. Nearly half of this increase is represented by gains in sales to foreign markets; export shipments alone were about 19,000 greater this year than they were last. The overseas selling performance of the American truck manufacturers is particularly striking in view of the fact that foreign markets as a whole have not been quite so good in 1926 as they were last year, at least so far as many passenger car makers are concerned.

In analyzing the gains which have been made in truck exports, it is especially interesting to note that the value of exported products increased to a greater degree

The Motor Truck Industry in 1926—

1. With a total output of nearly 540,000 vehicles it set a new production record.
2. It took definite steps looking toward stabilization of its methods of financing retail sales.
3. It pushed outward the boundaries of its overseas trade to a very marked degree.
4. It developed a multitude of new facts and data showing how its products—the bus and the truck—can best be made integral parts of our modern transportation system.

than did the number of units—quite an unusual occurrence in these days of generally declining prices and gradually narrowing profit margins. The average value of the trucks exported in the first 10 months of 1925 was only \$579 as against an average value of \$614 for those sent overseas in the first ten months of 1926.

This rise in unit value is in line, however, with the general trend of average wholesale prices of trucks. The average wholesale price of trucks reached its maximum back in 1918 when it was in the neighborhood of \$1900. From that point, however, it declined steadily until 1923, at which time it had reached a level of about \$890. In 1924 it rose to nearly \$900 and in 1925 advanced again to somewhere between \$910 and \$925. Another slight rise in average wholesale value is indicated by partially complete figures for 1926.

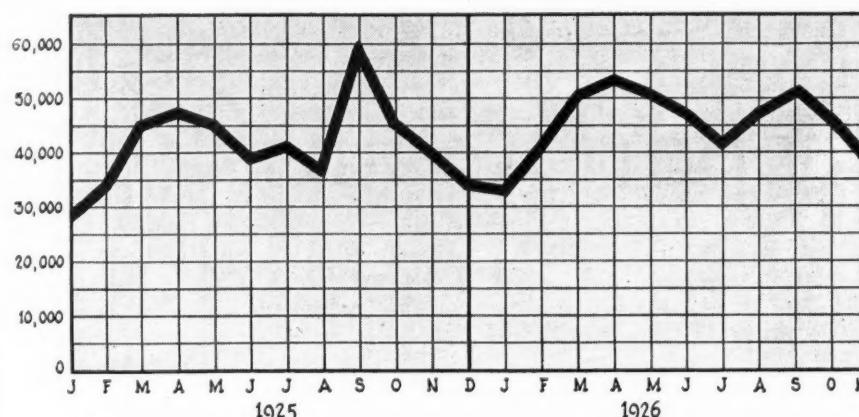
Purely domestic sales of trucks and buses—that is in the United States alone—increased during 1926 only between 2 and 3 per cent as compared with 1925. Detailed figures for 10 months, for example, show that in 1925 production for domestic consumption was 364,408, while in 1926 it edged up to 372,699—an increase of 8291 or about 2.3 per cent.

Among the striking features of the past year's truck development was the very great increase in production of trucks of 1 to 1½-ton capacity as compared to the rate of output growth for vehicles of other sizes. Every month during the past year, the volume of 1 to 1½-ton jobs has showed a very marked increase over the similar month of 1925, a record which is not equalled in steadiness and consistency in any other tonnage

Motor Truck Production—U. S. and Canada

Month	1925	1926
January	28,203	33,461
February	34,482	41,685
March	45,180	49,233
April	47,984	53,887
May	45,719	51,333
June	38,151	47,115
July	41,870	41,921
August	37,850	47,907
September	60,482	51,299
October	46,013	46,965
November	40,048	39,000*
Total	465,982	503,806
Gain, 1926 over 1925—		
8.13%		

*Estimated



Makers of heavy-duty trucks did about as well this year as they did in 1925, but some of them experienced a falling off somewhat more severe than merely seasonal influences would account for during the third and fourth quarters of the year.

Bus Progress Continues

Bus sales have continued to progress during 1926, but the development of this line of commercial vehicles has not been quite so rapid as some had expected. Electric railways, while they have increased their number of bus installations, have not shown any marked appreciation of the possibilities of the bus as a unit for handling mass transportation. There seems to be a

growing feeling on the part of certain important executives in the bus field that more definite steps should be taken in the future to demonstrate to the public the real potentialities of the motor bus in handling mass transportation, even though entire agreement as regards its merits for this purpose cannot be reached by all types of transportation interests. This view is not universal in the bus field, however, so that the immediate trend of future events cannot now be predicted with certainty.

The fact remains that motor bus production for the last half of this year didn't measure up to that of the last half of 1925 for at least a number of important makers. While detailed and accurate figures on bus output are almost impossible to obtain, it appears likely that the 1926 production of these vehicles was little if any in excess of the 17,500 estimated as having been put into operation during 1925.

Truck output has been fairly well stabilized throughout the year. A new record for total output has been set, but no new record for a single month's production was set up; September, 1925, with its 60,482 commercial vehicles, still remains as the biggest truck production month.

Steady Production Maintained

During the last year, however, the 50,000 mark has been exceeded in three separate months, while January was the only one of the first 11 months to fall below the 40,000 level. Last year, on the other hand, the record-breaking September total was the only one to be above 50,000, while output fell below 40,000 on four occasions, namely, January, February, June and August.

In the first 11 months of this year, there were produced in the United States alone as many trucks and buses as were built in both United States and Canada during the similar period of 1925.

That part of the 1927 outlook which is visible at present shows itself favorable to a continuance of reasonably good business. There is a general feeling on the part of many truck executives that no new production record will be set during the next 12 months, but that the trucks which are built will be sold on sounder terms and at greater net profit than were those which the industry disposed of in the last year or two.

Motor Truck Exports (U. S. and Canada—10 months)

1925		1926
13,145	Canada	17,554
42,420	U. S.	56,232
<hr/>	<hr/>	<hr/>
55,565	Total	73,786
	VALUE	
\$ 4,205,618	Canada	\$ 5,950,241
27,922,712	U. S.	39,293,447
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\$32,128,330	Total	\$45,243,688

Gain in units, 1926 over 1925—32.8%

Gain in value, 1926 over 1925—40.8%

Motor Truck Production For Domestic Consumption (10 months)

1925		1926
364,408		372,699
	Gain, 1926 over 1925—2.3%	

New Reo "Flying Cloud" Announced With L-Head Engine

Model which makes debut at New York show will be first with important changes in design offered by this company in eight years. Unit powerplant and new Lockheed brakes are features.

By Leslie S. Gillette

THE first brand-new Reo car to be announced in eight years will be introduced to the public at the New York show by the Reo Motor Car Co., Lansing, Mich. It is to be known as the "Flying Cloud," has a six-cylinder L-head engine, will be the only passenger car chassis model in the line, and will sell in the same price range (\$1500-\$1800) as the Model T-6, which it replaces.

Features that chiefly distinguish the new model from the previous one are the moderately high-speed L-head engine, a unit powerplant and a four-wheel Lockheed hydraulic braking system of new design, with internal brake shoes. Innovations in roof and body design, the use of 18-in. wheels and a low mounting of the frame have resulted in making the new car of very low-hung and stable appearance.

Bodies have heavily rounded rear upper quarters, curved roof sides, and long hood and cowl lines. Their appearance is further enhanced by window recesses finished in a distinctive color, an entirely new radiator design and a two-tone color effect. The line of one open and four closed models is as follows: Five-passenger sedan, four-passenger coupe, victoria, brougham, roadster.

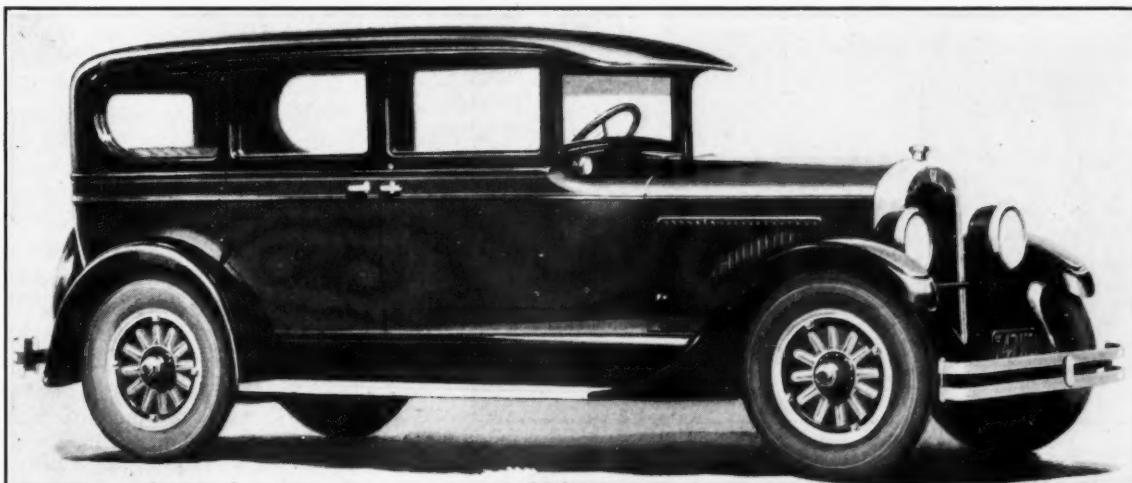
The new model is a modernized version of the T-6. With the abandonment of several of the characteristic features of the earlier car, such as the F-head engine, sub-frame and separate transmission, certain economies in production were made possible, but these were offset by the adoption of four-wheel brakes, the use of new equipment for finishing bearing surfaces, and

improvement in body appointments, and the Reo therefore remains in the same price class.

As regards performance, figures furnished by the company show that the new car is capable of accelerating from 5 to 25 m.p.h. in $7\frac{3}{4}$ sec., has a top speed of 70 m.p.h. and a speed of 46 m.p.h. in second speed. The wheelbase is 121 in. and the five-passenger sedan, ready for the road, weighs 3700 lb.

The engine, which is manufactured completely in the Reo shops, is of the seven-bearing L-head type, of $3\frac{1}{4}$ in. bore and 5 in. stroke, giving it a piston displacement of 249 cu. in. It has a compression ratio of 4.8 to 1, and is said to develop 73 hp. at 2800 r.p.m. As compared with the previous model, the bore has been enlarged by $1/16$ in., while the stroke remains the same.

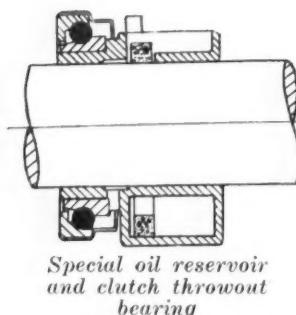
The cylinders and crankcase form a unit of cast iron, the cylinder head being detachable, and the oil pan is made of pressed steel. Water from the pump at the front end of the block is made to circulate under the valves first, and from there it passes around the cylinder barrels. Two cover plates on the left side of the block help to give a rigid support to the jacket cores and facilitate inspection of the water passages. A Bishop & Babcock thermostat is fitted at the water outlet in the cylinder head. Round, hollow bosses formed at the ends of the engine arms are fitted with two rubber bushings, each inserted from opposite sides. These rubber bushings are formed with flanges at their ends which prevent metal-to-metal contact between engine and mounting brackets. A bolt passes



Standard five-passenger sedan on the new Reo "Flying Cloud" chassis. This model is expected to be the most popular in the line

REO "FLYING CLOUD"

Automotive Industries
December 30, 1926



*Special oil reservoir
and clutch throwout
bearing*

through the mounting bracket and the rubber bushings of the engine arm.

Seven bronze-back, babbitt-lined bearings support the fully machined and balanced crankshaft. All journals are lapped by Schraner machines and this reduces the time usually necessary for the bearings to wear in, and also permits of reduced clearances.

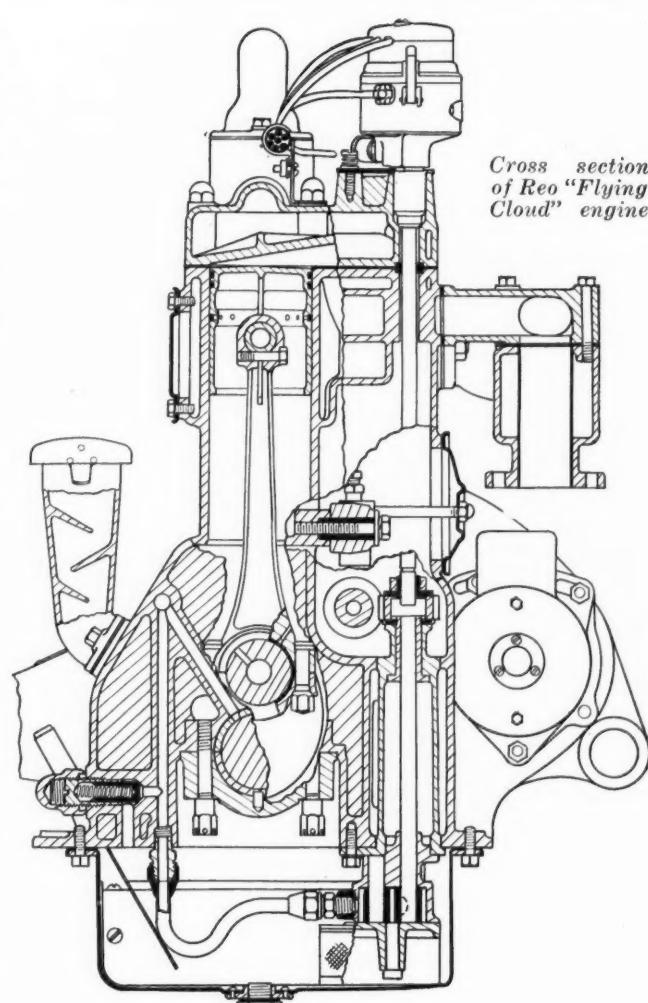
At the forward end of the crankshaft is mounted a Lanchester vibration damper which is combined with the fan drive pulley. All main journals are 2.3125 in. in diameter and their lengths are as follows: Front, 2.1875 in.; center, 1.8125 in.; rear, 2.750 in.; intermediary, 1.3125 in. Thrust is taken on the rear bearing. Main bearing clearance is 0.002 in., and end play 0.004 = 0.006 in.

Drive to the four-bearing camshaft is by a Morse 1½ in. wide chain, adjustment for wear of the latter being made by a swinging generator mounting. The chain is 32 in. long and of ½ in. pitch. The bronze bearings of the camshaft are of the following sizes:

	Front	Second	Third	Rear
Diameter	2.185	2.125	2.062	1.500 in.
Length	1.625	.875	.875	1.935 in.

The valves are operated by mushroom tappets. They have a clear opening of 1⅜ in. and a lift of 5/16 in. Inlet and exhaust valves both are of the one-piece variety, the former being made of chrome-nickel and the latter silicrom steel. The valve guide clusters, formed in two groups of six each, have their barrels burnished with a steel ball after reaming, to insure accuracy of fit. Valve timing is as follows: Intake opens in T.D.C.; intake closes 40 deg. late; exhaust opens 48 deg. early; exhaust closes 2 deg. late.

Aluminum alloy pistons are used with three 3/16 in. rings, all above the pin. Piston pins, of 0.938 in. diameter, are secured in the upper end of the rod and work in the piston without bushings. The lowest of the piston rings is of the Quality Drain Oil type and requires oil return holes in the ring groove. The pistons are 4 in. long and weigh 1.46 lb. complete. Connecting rods are of conventional design, 10½ in. be-

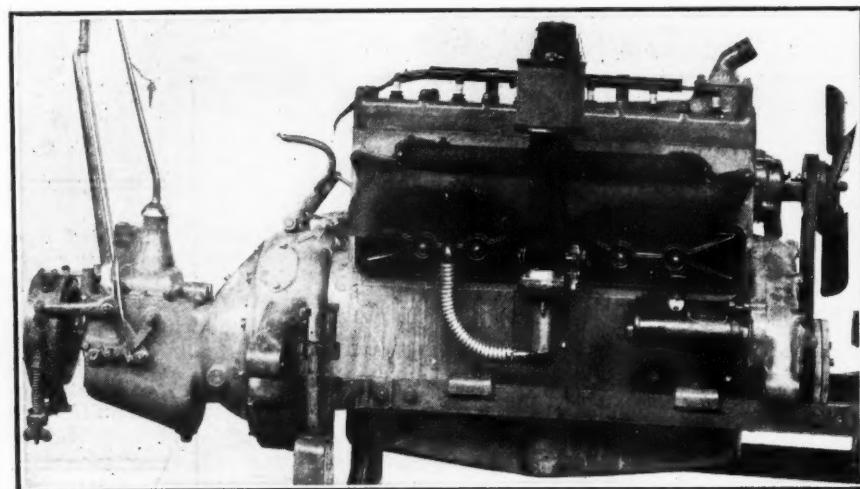


*Cross section
of Reo "Flying
Cloud" engine*

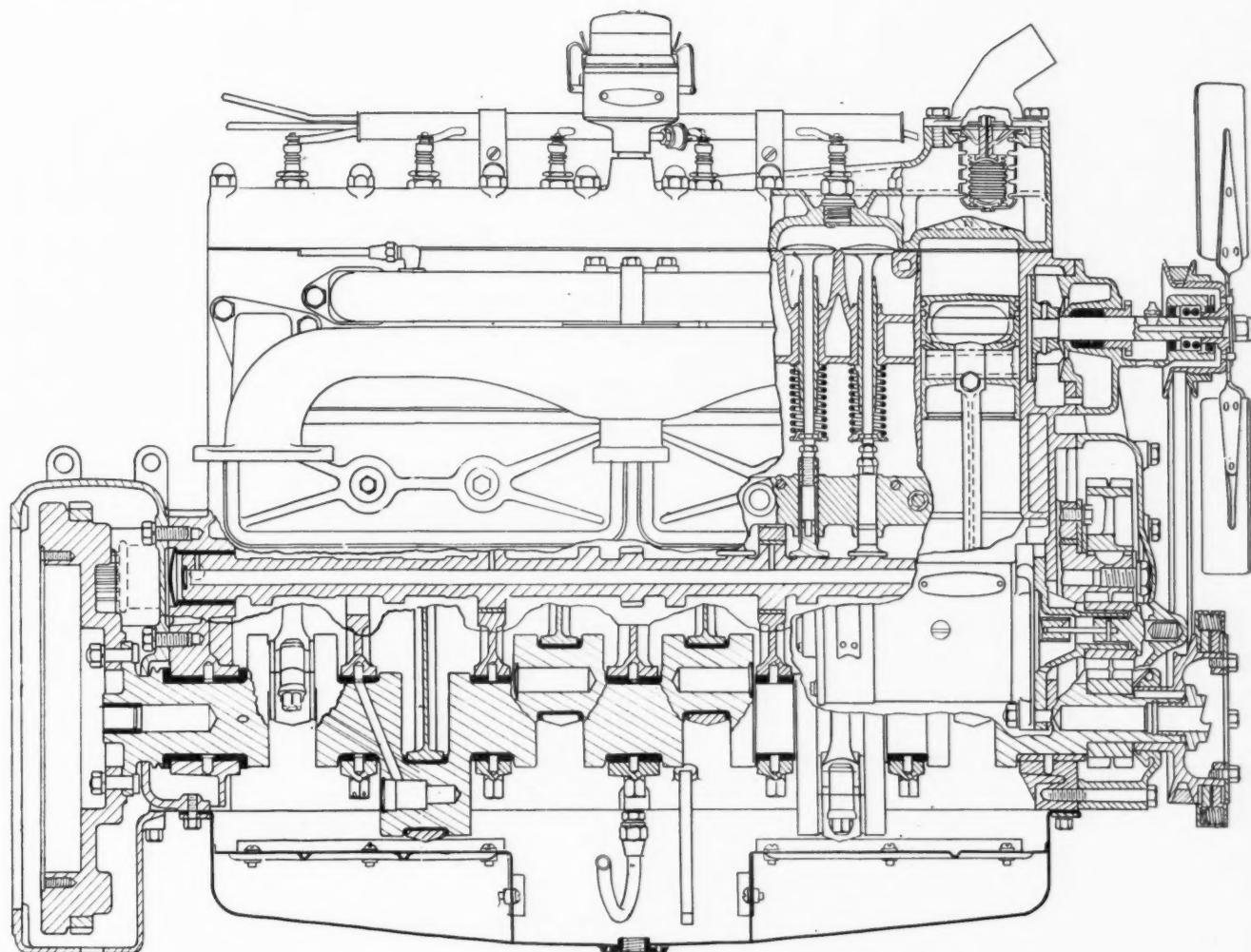
tween centers, and weigh 2.47 lb. The big end bearing is 2.065 in. in diameter by 1.50 in. long and has the babbitt cast in directly. Bearing clearance is from 0.0015 to 0.0025 in.

Oil is supplied under pressure to the crankshaft, connecting rods and camshaft bearings, from a gear pump located in the oil pan. The method of mounting the pump assembly is unusual and provides a ready means of removing the unit complete with drive. A casting embodying the mounting bracket and the pump unit with a screen is bolted to the lower flange of the crankcase at the center bearing.

Oil from the pump enters a vertical passage drilled in the crankcase, which connects with a similar passage running lengthwise of the case. From this main distribution line there are ducts to all of the main journals. Holes drilled from the main journals to the crankpins provide plenty of oil for the connecting rod bearings. Oil is led to the camshaft bearings through the hollow shaft, and an extra lead feeds oil to the timing chain. An oil filter of Handy make is mounted on the dash. Alongside of the bayonet type oil gauge the relief valve is placed, which is set to open at 30 lb. pressure. The capacity of the crankcase is 6 qt.



Valve side of the L-head powerplant used in the new Reo car. The air cleaner, mounted vertically above the carburetor, is shown in this picture



Longitudinal section of Reo L-head engine

The riser of the inlet manifold passes through the exhaust manifold, thus forming a hot spot. The siamesed intake ports and the individual exhaust ports are of square section, which corresponds with the general layout of the manifolding. A 1½ in. Model S Schebler carburetor with vertical outlet is fitted with an Air-Maze screen-type air filter. Feed to the carburetor is by a Stewart vacuum tank, from the 17-gal. tank at the rear of the chassis.

All electrical units are of Remy-Delco make. The distributor is provided with a semi-automatic advance and fires the cylinders in the order 1-5-3-6-2-4. Engagement of the starter with the 111-tooth flywheel gear is by a mechanically operated gear shift through an overrunning clutch. The generator is provided with a thermostat and is mounted on the right side of the engine. The battery is of Willard make, of 6 volts and 111 amp.-hr. capacity, and is carried beneath the front seat.

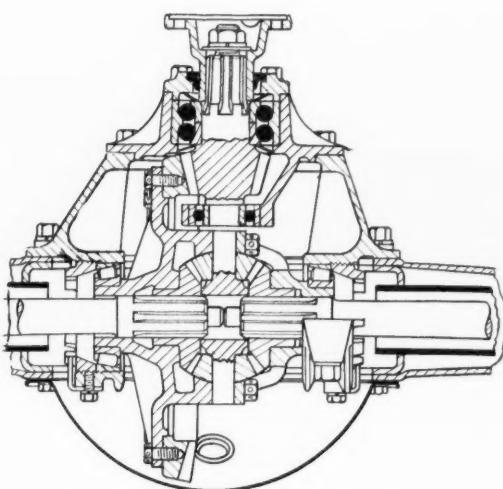
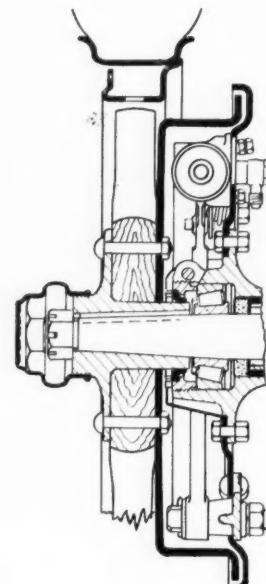
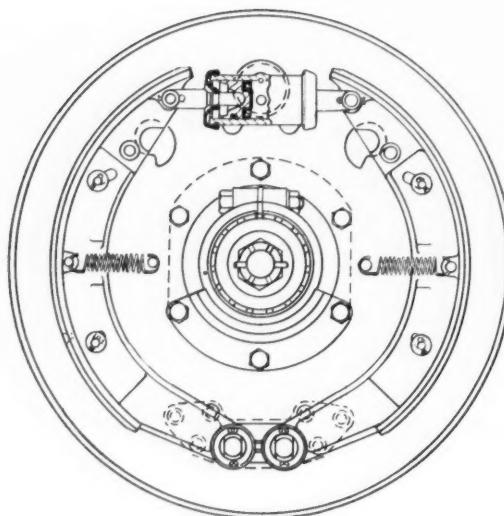
Water circulation is by a centrifugal pump built together with the fan and driven by a ¾ in. V-belt. The rear end of the pump shaft is supported by a plain bronze packing nut, while the forward end is carried by a double row ball bearing. Lubrication of the front end is by a Zerk fitting screwed into the hollow shaft. Adjustment for fan belt wear is by a movable flange on the pulley. The Harrison radiator is inclosed by a nickelized, pressed-steel shell.

Both the clutch and transmission (which form a unit with the engine), are modeled along conventional lines. The long single plate clutch has the friction

lining riveted to both sides of the 9¾ in. driven disk. Smooth clutch operation is obtained by imparting a slight dish to the plate, so that its outer edge makes contact with the driving member first. Positive lubrication for the ball throwout bearing and the clutch sleeve is insured by an oil reservoir having wick feed to the sleeve mounted on the shaft just back of the bearing.

The transmission, which is of Reo make and of the selective sliding type, provides the following gear ratios: Low, 3.26 to 1; second, 1.73 to 1; third, direct; reverse, 4.136 to 1. The cluster gears are fitted with bronze bushings and rotate on the stationary counter-shaft. A transmission lock is fitted.

Drive to the rear axle is through two metal universal joints of Universal make, and a tubular propeller shaft. The rear axle is of the semi-floating type, with the usual spiral bevel drive providing a 4.58 to 1 ratio for closed cars and a 4.25 to 1 ratio for the roadster. The Hotchkiss drive is used. A feature of the rear axle is the non-adjustable pinion mounting. A separate casting providing a straddle type mounting for the stem pinion is bolted to a flange on the front part of the differential carrier. In the assembling operation the pinion is set by a gage so that it is properly located with respect to the axis of the differential unit. Shims are inserted between the pinion unit and the differential carrier, while the usual form of adjustment is provided for the ring gear. The differential unit is carried on Timken taper roller bearings of the same type as employed at the wheel ends of the 1½ in.



Views of rear axle center and end, and of rear wheel brake

axles. Road clearance of the rear axle is $8\frac{1}{2}$ in.

The front axle has a reverse Elliot spindle mounting. Both ends of the $\frac{3}{4}$ in. king pins are mounted in bronze bushings, while the thrust is taken by a radial ball thrust bearing. The spindles are given a transverse inclination of $2\frac{1}{2}$ deg., while the king pins are inclined at $7\frac{1}{2}$ deg. The caster angle is $1\frac{1}{2}$ deg. The Ross Model E cam and lever type steering gear provides a ratio of 12 to 1 at the ends and 16 to 1 at the center. From locked to locked position of the wheels, the 18 in. steering wheel requires $2\frac{1}{2}$ turns. Spark, throttle and lighting switch controls are mounted at the center of the wheel, along with the button operating the North East horn.

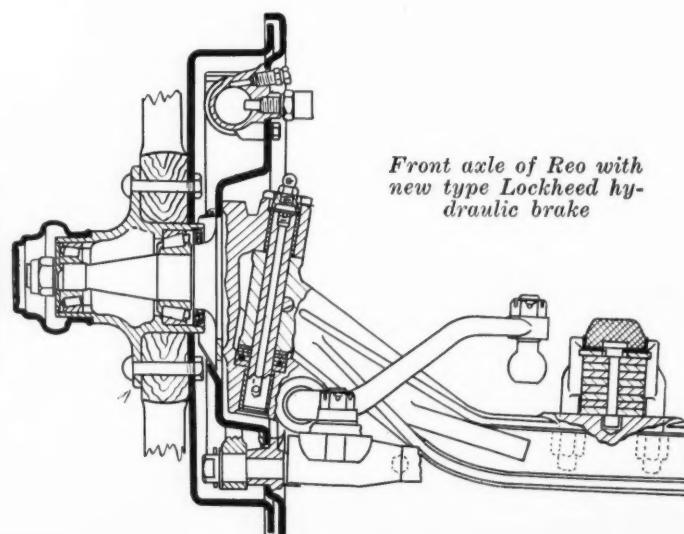
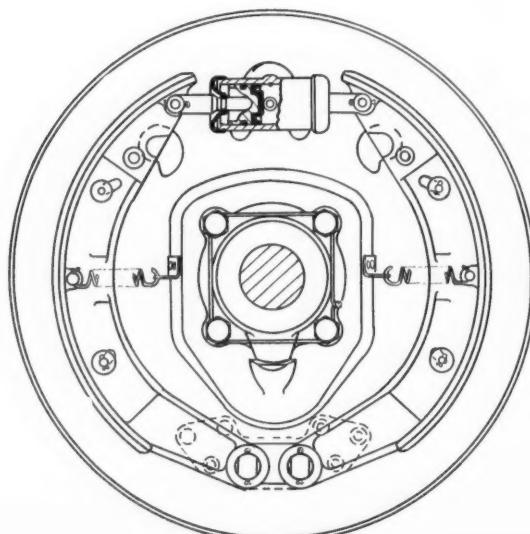
As already mentioned, the four-wheel braking system is the new internal shoe Lockheed hydraulic type. With this new design dirt and moisture are kept off the brake lining and the location of the operating cylinder inside the wheel prevents damage and reduces the possibility of foreign matter interfering with its mechanism. The two cast-aluminum shoes in each wheel are anchored on separate pins at the bottom of the cover plate, the operating cylinder being placed at the top. External adjustment is provided for each shoe.

A single, flexible rubber hose connects the chassis piping with the rear brakes. The hose joins to a T

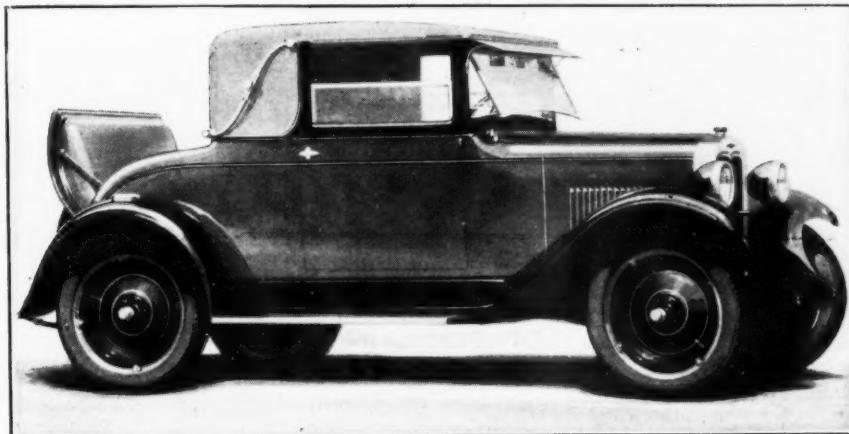
near the left spring pad on the axle, from which point the fluid is led to the two wheel cylinders. To prevent possible damage by flying stones the copper lead is reinforced by a steel wire covering. All four drums are 14 in. in diameter, and the brake lining is $1\frac{3}{4}$ in. wide and $\frac{3}{16}$ in. thick. The total braking area of the service brake system is 208 sq. in. The hand lever operates a band brake on a 7 in. drum behind the transmission, the braking area of this being 49.22 sq. in. The lining is $2\frac{1}{2}$ in. wide by $\frac{3}{16}$ in. thick.

All chassis springs are of the semi-elliptic type, the front being overslung, the rear underslung. Front springs are 37 in. long and have 8 leaves. The rear springs are 55 in. long and have 10 leaves. Both are 2 in. wide. Seven cross members are provided in the Smith pressed-steel frame, which has a 6-in. depth and is of $5/32$ in. stock. Mountings are provided on the spring horn castings for the attachment of bumpers. The usual kick-up is provided at the rear axle. Motor Products 18 in. artillery wheels carry 4-in. base split Firestone rims, on which are mounted four-ply tires. The standard tire size is 30 by 6.20 in., except for the roadster, which carries 30 by 6.00 in. tires. Chassis lubrication is by the Zerk pressure.

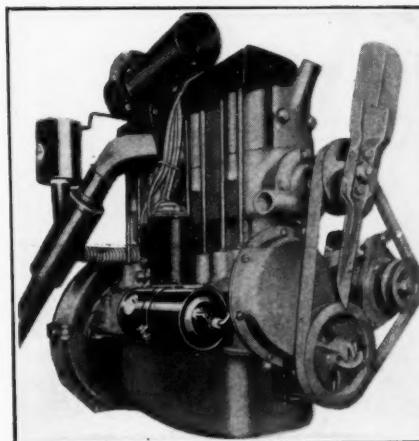
All cars are fitted with a set of Lovejoy shock absorbers and two-filament headlight bulbs.



Front axle of Reo with new type Lockheed hydraulic brake



*Sport cabriolet which has been added to Chevrolet line.
Price is \$715*



1927 Chevrolet engine, with air cleaner and oil filter

1927 Chevrolet to be Equipped With Oil Filter and Air Cleaner

Coincidental lock also adopted. Entire line improved in appearance. Sport cabriolet added. Prices cut.

CHANGES in the appearance of the Chevrolet, effected chiefly by the adoption of new bodies finished in the double-belt style, full-crowned fenders, new design radiator shell and bullet-shaped headlights, have resulted in the new cars being announced as "The Most Beautiful Chevrolets." Formal showing of the new models by the Chevrolet Motor Co. will begin on Jan. 1.

With the addition of an entirely new body style, a sport cabriolet, the line for 1927 will comprise seven body models. Window reveals finished in contrasting colors are a feature of all closed models. Due to slight refinements in chassis and body design, the new cars have been reduced in height considerably without sacrificing interior head room.

Mechanical changes on the chassis are of minor importance, although on the engine AC air cleaners and oil filters and an improved type, large-capacity oil pump have been adopted. Balloon tires, size 29 x 4.40 in., are now standard equipment on all body models, whereas previously the open cars carried 30 x 3½ in. high pressure tires. Steel disk wheels in colors to match the bodies are also standard now on all models with natural wood artillery wheels optional at slight additional cost.

Narrower windshield corner posts providing better vision are adopted on all closed models, while the doors of these cars are equipped with remote type latch controls. In place of the previous ignition switch on the instrument panel, a coincidental lock securing both the ignition and steering gear is fastened to the instrument board near the steering column. Along with this improvement, the instrument board is of new design and carries a new type dash light while the control for the automatic windshield cleaner, the

latter now being standard equipment on all models, is mounted also on the dash at the extreme left side. The steering wheel is of walnut finish and is 17 in. in diameter.

The running boards have been made heavier and are more rigidly mounted. Cowl lights to match the headlights are employed on all cars. The radiator is slightly higher and of greater capacity than that used on the previous cars. In place of the previous fluting and sharp corner effect on the shell, the new radiators have a smooth front with rounded corners while the inner contour has been made to conform with the outside shape of the shell. A tank gasoline gage and combination tail and stop light have been added also to all cars.

The Fisher-built sport cabriolet body, which is the new addition to the line, is equipped with a non-folding top of tan whipcord material with the upholstery in both front and rear compartment of tan grained leather to match. Nickel plating is used extensively on this model which will list at \$715.

With the announcement of the new line of cars, the Chevrolet Motor Co. makes reductions in price of \$20 to \$50 on the closed cars. The old and new prices are as follows:

	Old Price	New Price
Roadster	\$510	\$525
Touring	510	525
Coach	645	595
Coupe	645	625
Sedan	735	695
Landau	765	745

The cost of the open models previously, when equipped with balloon tires as extra equipment, was \$535. As these cars now have balloon tires as standard, the new price represents a reduction of \$10.

Among the New Models to be

1927 Oldsmobiles Have Four-Wheel Brakes

ALL Oldsmobile models for 1927 will be equipped with Bendix three-shoe front wheel brakes at no increase in price. Larger cross section tires mounted on smaller diameter wheels and new carburetor equipment are now fitted and several other mechanical changes have been made. A new touring car with rigid-detachable side curtains, has been added to the line. The body range, colors and equipment on the 1927 cars are substantially the same as those of 1926.

The front wheel brakes are mounted on the new models without any change in the hookup or operation of the external rear wheel brakes, which are of the same type as those employed on the previous cars. The leverages of the four-wheel brake system are designed so that the braking force is distributed 50-50 on the front and rear wheels. To make for simpler arrangement, the hand brake no longer operates on the transmission brake drum but is connected with the rear wheel brakes. While the hand lever operates the same rear shoes as are used in the service brake system, both systems function independently of one another. Due to the nature of the brake linkages, the setting of the hand brake depresses the brake pedal. The front wheel brakes are of the conventional Bendix, three-shoe, self-energizing type operated by a lever mounted on a boss near the axle spindle mounting.

The new five-passenger touring car model is expected to find the biggest market in the overseas trade. The top in its folded position sets below the body lines of the car. The rigid side curtains with large Pyralin windows are designed for use when the top is in the folded position, to provide wind protection for the occupants. When not required, the side curtains are stored in a compartment behind the rear seat back cushion. Leather upholstery is employed for the seats and cushions.

Better riding qualities are claimed for the new cars

through the use of 30 x 5.25-in. tires in place of the previous 30 x 4.95-in. tires.

Another change on the chassis is a new method of securing the steering gear in which the mounting is slipped into a trunnion and bolted to the chassis side rail instead of being clamped on the trunnion. The battery carrier has been altered so that a rubber case battery of the type used by Chevrolet may be employed.

Several changes have been made in the engine, two of which are said to have added materially to its power output and smoothness. A Johnson Model H carburetor of 1-in. outlet diameter replaces the former make and type employed. The new carburetor, of lighter construction and embodying an economizer, is of the air valve type. Due to the horizontal position of this valve, the air cleaner is now mounted in the upright position and is connected to the carburetor by a vertical tube. A change in the combustion head contour is stated to have added materially to the smooth operation of the engine. To prevent the oil surging away from the oil pump when the brakes are applied suddenly, special baffles have been installed in the oil pan to insure an adequate supply of oil to the pump under all conditions.

Equipment on the new de luxe touring car includes front and rear bumpers, trunk and rack, Moto Meter, cowl lights, rear view mirror, stop light and automatic windshield cleaner.

Four Body Models Added by Chrysler

A NEW body model added to each of the four lines of Chrysler cars and the adoption of 18 in. diameter wheels on the "60" and "80" chassis constitute the new features to be introduced by the Chrysler Sales Corp. at the New York show.

A new standard five-passenger sedan, listing at



The rumble seat roadster on the "50" chassis which lists at \$795 and was recently added to the Chrysler line

New coupe with rumble seat on the Chrysler "60" chassis. This embodies the "cadet" sun visor first introduced on the "Finer Seventy" cars

Announced at New York Show

\$2675, the lowest priced closed car on the "80" chassis, has been added to the line. With the exception of this model which is finished in green and upholstered in a pleated mohair, a wide range of optional colors and upholstery is now offered on all Chrysler "80" models at no increase in cost. The new standard sedan has a soft top and uses nickelized drum type headlights.

Coincident with the addition of a coupe with rumble seat on the "60" chassis, a new type of oval instrument panel indirectly lighted and embodying a gasoline gage, is fitted on all "60" bodies. With this new arrangement the manifold heat control and choke, and the lighting and ignition switches are now mounted in separate oval panels to match the main center unit. Walnut panels are now fitted across the base of the windshield frame reveal. The new rumble seat coupe on the "60" line has the "cadet" type of sun visor which was introduced recently on the "70" series. Price of this model will be announced at the show.

The new body model on the "70" chassis is a four-passenger coupe and of the same general design as the other models in this line. On the "50" chassis a landau-sedan listing at \$885 has been added. This car has four doors and landau bows over the D-shaped rear windows. An automatic windshield cleaner is included with the usual items of equipment.

With the adoption of 18 in. wheels on the "80" and "60" chassis, the tire sizes on these two models are now 30 by 6.75 in. and 28 by 5.25 in. respectively. Eighteen-inch wheels were introduced first by Chrysler with the announcement of the "Finer Seventy" four months ago.

Leather upholstery for the "50" sedan and coach, "60" coach and sedan, and for the "70" brougham is offered at an additional cost while any of the four chassis may be equipped with a set of wire wheels as extra equipment.

Presentation of the two roadster models with rumble seats on the "50" and "60" chassis and listing at \$795 and \$1175 respectively, will be made formally at the national automobile shows. These models were announced briefly in *Automotive Industries* of Dec. 2.

Peerless Getting Ready to Build Lighter Six

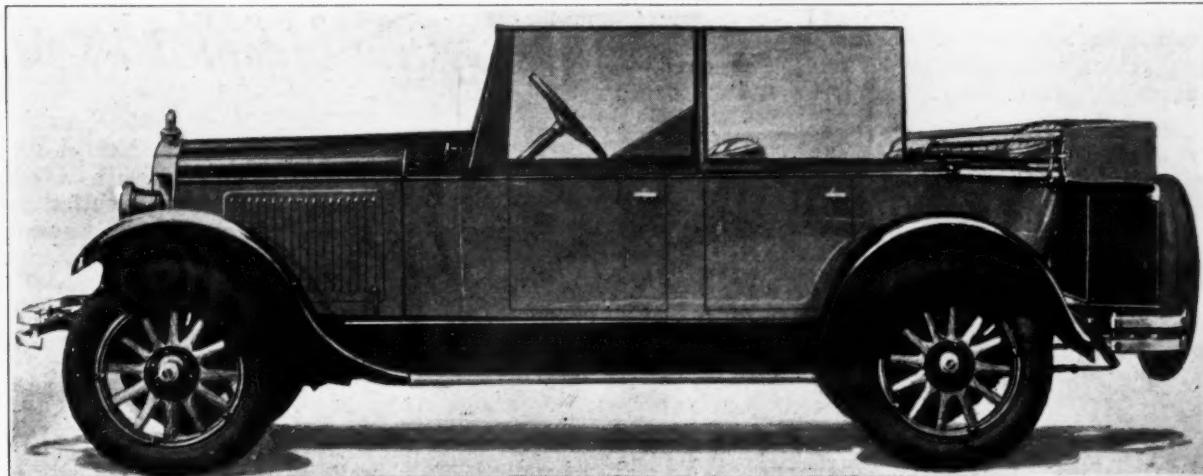
PEERLESS MOTOR CAR CO. is expected soon to announce a lighter six-cylinder car with a line of bodies ranging in price from \$1245 to \$1345, for the spring market of 1927.

No mechanical changes of any importance have been made on the present chassis. All of the bodies except one are unchanged in design although several of the models will appear at the show with new colors and new upholstery. The adoption of a D-shaped rear window in place of one of the oval type on the "6-90" close-coupled sedan listing at \$1895, constitutes the only body change.

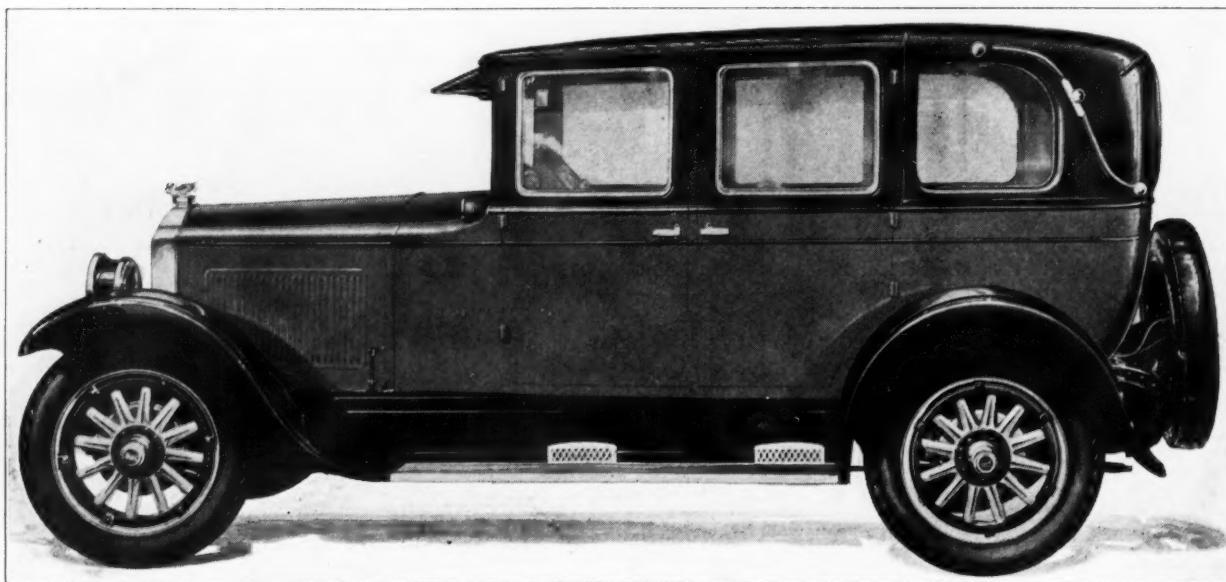
The new light six to be introduced in the spring will be the smallest and lowest priced model in the line and will follow the characteristic design of the other six-cylinder cars in the line. It will embody such features as an L-head engine, hydraulic four-wheel brakes, low-hung bodies and full balloon tires. With this new car the Peerless line for 1927 will comprise four "sixes" and one "eight."

Studebaker to Offer Color Options on Custom Models

THE Studebaker Corp. of America announces that color options will be offered at the New York show on four of its body models. On the President—the Big Six seven-passenger sedan—three color options will be available, while on the Chancellor, the Big Six victoria, the Big Six custom brougham and the Standard Six custom sedan two-color options will be offered. Other models in the Studebaker lines will continue to be offered in standard colors only.



New Oldsmobile de luxe touring car with rigid side curtains



Town brougham which has been added to the Buick "115" line

Aside from the adoption of new bumpers and a more attractive door handle design for the custom line of cars no changes have been made on them since their announcement last summer.

Packard Makes Change in Lubricating System

PACKARD cars presented at the New York show will be the same in practically every respect as the series introduced last August. The only change on the two chassis is an extra oil lead embodied in the one-shot oiling system to provide automatic lubrication for the clutch throwout bearing. A wide variety of different color combinations will make the line the most colorful in Packard history.

Latest Lincoln Model With Four-Wheel Brakes

THE view below of one of the latest Lincoln cars shows the four-wheel brakes, new headlights and radiator ornament which were recently made standard equipment on all models. Coincident with these changes prices were increased \$200. The changes were described in *Automotive Industries* of Dec. 9.



One of the latest Lincoln models

Town Brougham Added to Buick "115" Line

THE Buick Motor Co. has added a new closed body model which will be displayed at the New York show for the first time. The new body is mounted on the 115-in. chassis and is called a town brougham. It is a four-door car with leather rear quarters and dummy landau irons.

This year Buick is designating its models by wheelbase lengths, so that the town brougham is a part of the Series 115 line.

The town brougham carries the same color scheme and is a companion model to the de luxe, two-passenger coupe of the same wheelbase. The upper part of the body, including the top, is Delaware green with the lower panels Yorktown green. The molding is black with gold striping. Wheels are natural wood with hubs, drums and felloes painted and striped to match the body. Upholstery and trim are mohair plush in colors harmonizing with the exterior.

Crankcase Ventilating System Adopted by Moon

THE Moon 6-60 chassis to be shown at the New York show will be equipped with a new air cleaner, crankcase ventilating system and a built-in thermostatic water control. Air is taken out of the crankcase through an elbow in the valve cover plate and is led through the air cleaner by suction through the carburetor intake.

The thermostatic device consists of a butterfly valve operated by a spiral shaped thermo unit and it permits water to circulate only after a temperature of 160 deg. has been reached around the cylinder block.

Just Among Ourselves

Freight Terminals Need Radical Changes, Editor Says

NOW that railroads and motor truck interests all seem more or less agreed about the desirability of having freight terminals located in non-congested areas whenever possible, one of the chief points up for discussion is a definition of "whenever possible." Bruce W. Crandall, *The Railway Review*, urged rather drastic measures in his recent talk before the S.A.E. in Boston. Coming from a man thoroughly familiar with the railway side of the case, his ideas are particularly interesting. After pointing out that either we can retain existing terminals as now placed and speed up traffic through them without large capital expenditures or we can plan new terminals in new locations looking to present needs and future requirements, Mr. Crandall went on to say: "The retaining of existing terminals as now placed, with the idea of making some improvements, doesn't appeal to me at all. It is like putting a new piece of cloth on an old garment. It won't work."

* * *

Who is Going to Pay the Costs?

IT is obvious that the relocation of large numbers of freight terminals would involve a tremendous expense as well as numerous problems both political and economic before the readjustment could be completed. Mr. Crandall admitted these difficulties. He asked the questions: "How is such a project to be financed?" "Can the railroads themselves be brought into agreement as to which is the wisest course to pursue?" and "Can the widely conflicting interests of the public be har-

monized?" He admitted that the difficulties would be extreme, but voiced the opinion that the resulting benefits would warrant the effort necessary to overcome the obstacles. There is much in Mr. Crandall's remarks to warrant close study and serious thought on the part of both automotive and rail executives.

* * *

Here and There in Our Holiday Mail

GO T a Christmas greeting from Olds Motor Works which is so deftly phrased and so much in harmony with our own feelings that we want to pass it along. Here's the way it reads:

You will find at this joyous season
That men meet you frankly,
Greet you cheerily,
Treat you with hearty good will.
You will find it so
Because present days, as surely
as those past,
Are the "Good old days."

And while it's manifestly impossible for us to tell about all of the attractive cards and greetings which came across our desk again this year, we do want to say here and now that they all were very much appreciated. We'll have to content ourselves with mentioning just one more specific card—the one which came from Brown Joyce up Bristol, Conn., way. Above the usual Yuletide greetings appeared a picture of a happy looking little pup adorned with a coiled spring tail which stood out proudly at right angles to the card and wagged entrancingly—which we think was a pretty darned good idea considering B. J.'s business, but, he hastened to assure us, "the representation doesn't mean that Wallace Barnes has gone back to waggin' days." Ouch!

Ford Disposes of the "Six" Rumor

TIMES must be changing out at the Ford plant. The big Highland Park plant always has been heralded as a marvel of efficiency where every man worked purposefully and seriously, his every effort bended directly toward the completion of a practical product. Now Henry Ford himself has announced that he has his engineers at work on experimental problems for no other reason than to keep them from thinking too much about how to improve the Model T. "It is true we have experimented with six-cylinder cars," Mr. Ford is quoted by the *Wall Street Journal* as saying, "as we experiment with many things. They keep our engineers busy and keep them from tinkering too much with the Ford car. The Ford car is a tried and proved product that requires no tinkering."

* * *

How About a Nice Cathode Ray Finish?

WHAT will come next? First we do our best to develop finishes that are not affected by light and will protect the surface in spite of it, then along comes one of these "new day" scientists who proceeds to utilize light to deposit a yellowish lacquer on solid substances. Dr. William D. Coolidge with his new cathode ray tube has done just this. Under the action of the rays from this tube acetylene gas is deposited as a hard lacquer on any object enclosed in a glass chamber containing the gas. Who knows but that we may some day put parts of our cars or even the whole chassis or body in a gas chamber and later remove them completely finished.—N. G. S.

Up and Down Motion of Car Actuates New Alemite Oiling System

Lubricant fed continuously to chassis bearings from central supply tank fitted with sensitive pumping mechanism.
Flow of oil at each bearing can be controlled.

By G. E. Packer

SEVERAL new principles are incorporated in the latest Alemite chassis lubrication system, which insures a continuous supply of oil to the chassis bearings. The main parts of the system are the oil tank of 1½ pt. capacity in which the pumping mechanism is housed, the resistance units that meter out the oil to the bearings, and the necessary fittings and tubing.

The supply tank resembles the typical vacuum tank and is mounted on the engine side of the dash or directly on the engine. It is the up and down motion of the car as it moves along the road that operates the pumping mechanism. This is one of the outstanding features of the device as increasing car motion or vibration causes increased oil flow with the result that the lubrication is in proportion to the work being done by the chassis bearings.

Within the supply tank is an inertia weight that is pivoted and supported with a coil spring so that the least vibration or motion will cause it to move. In fact it is impossible to walk across the room with this device without causing it to function. Even on a car that is running on car tracks the pump will operate

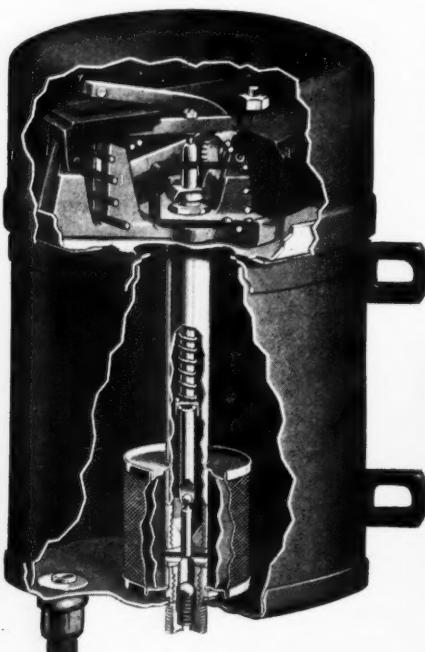
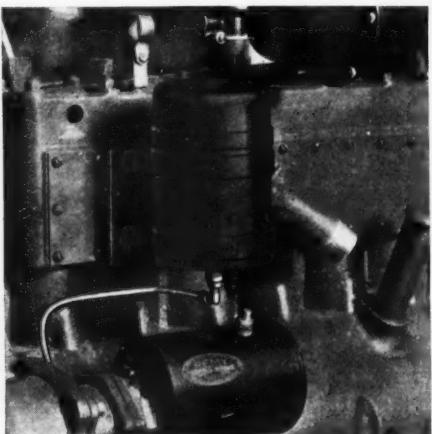
but at much slower speed than when on a rough road.

Connected to this freely moving inertia weight is a pawl which engages with a ratchet wheel as shown, so as to convert the slight oscillating movement of the weight into rotary motion of the ratchet wheel. Integral with the ratchet wheel is a cam that slowly raises the oil pump plunger against light spring pressure and when the plunger is at the height of its stroke it is released. The compressed spring drives the plunger down.

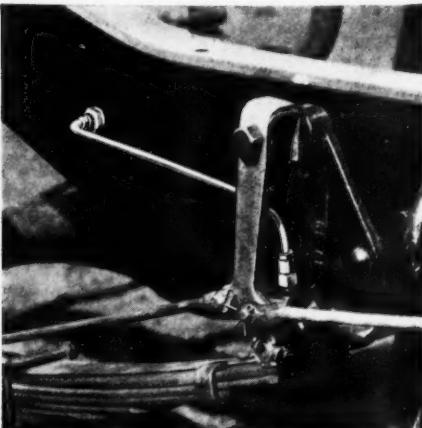
The volume of oil that this device must pump is very small and consequently the pump diameter is small. The result is that very high pressure can be developed by the pump even with light spring pressure. In winter, when the oil tends to congeal, pressure as high as 100 lb. will be developed, or sufficient to insure lubrication even at low temperatures.

There is only one adjustment to be made on the pump unit. This is on the vertical position of the plunger rod. Raising the plunger rod decreases the quantity of oil. The plunger rod may be raised and lowered by means of the small screw on the cam wiper. After this screw is adjusted its position is secured by means of the lock nut.

Typical mounting of the Alemite centralized pumping unit



Sectional view of oil supply tank and pumping mechanism in the Alemite centralized pump



Special Alemite resistance unit installed at chassis bearing. Note the branch line connected to the main oil artery that is carried in the channel of the frame

The check valve and pump mechanism are protected from foreign matter in the oil by a fine mesh screen in the bottom of the oil supply tank. To prevent excessive resistance to the flow of oil this screen has an area of 6 sq. in.

While special tubing that is exceptionally free from scale is used, precautions against clogging the system in addition to the screen in the oil tank are taken. Each resistance unit used at the bearings lubricated by this system has its own strainer.

The oil is pumped from the main tank to an artery of $\frac{1}{4}$ in. tubing. From this artery $\frac{3}{16}$ in. branch lines lead to the chassis bearings. Naturally there is some resistance to the flow of oil in these lines and particularly is this true in winter. Also if it were not for the resistance units the amount of oil that reached each bearing would vary radically, it being quite likely that the loosest bearing would get an excess of oil while tighter bearings or ones farther from the pump would be starved.

The resistance units look like elongated tubing connectors. One end is threaded and is screwed into the bearing. The other end has the customary compression coupling that is tightened by a packing nut. The oil line is attached here. As the oil enters the fitting it must pass through a strainer and also a check valve. This is for the purpose of excluding foreign matter from the resistance passages and to prevent the draining of the oil line when the car is standing.

The resistance section consists of spiral passages through which the oil must pass. These passages are constructed by tapping the oil hole, which is about $\frac{3}{16}$ in. in diameter, so that a small brass fillister head screw can be screwed into it. This screw has been especially prepared by grinding off about half of its thread. As the screw then does not fully seat in the thread of the fitting a small passage is left. By running the screw into the fitting a greater length of thread is engaged. This forces the oil to travel a greater distance through the small passage, thus increasing the resistance. Where a larger flow of oil is desired or where the bearing is far from the pump, the screw is not run in so far and as a consequence the resistance is diminished. In this manner the amount of oil that reaches each bearing can be accurately controlled.

The new development will be known as the Alemite Continuous Chassis Lubrication System.

Federal-Aid Roads Now Total 53,000 Miles

TAXATION for main road improvements should be on a state-wide basis in contrast with taxation for work on roads not included in the state main highway system, which should be derived mainly from real property taxes assessed on the property through which the roads pass.

No road should be improved by the expenditure of public funds in excess of its earning capacity.

Nearly a third of the comprehensive Federal-aid highway system has already been improved to a degree commensurate with present traffic demands.

These are the highlights of automotive interest in the annual report of the Secretary of Agriculture. The secretary is convinced that money spent on highways brings a compensating return in reduced expense for operating vehicles. In allocating the cost of road work, however, he believes that consideration should be given to the class of traffic which uses the roads.

On main roads of the state-wide systems much of the traffic is inter-city in character and farmers benefit from such roads only as they use them in common with the more numerous users who live and work in the cities. For this reason Secretary Jardine believes that revenues for construction and maintenance of such roads should be provided on a state-wide basis rather than by a system which places much of the burden on farm land.

Roads which do not belong to the main road system, however, are usually devoted to the service of farm land and many of them accommodate no one but a few farmers and the secretary believes that farm land might well be taxed to pay for this type of road since its cost will be directly returned in decreased transportation costs.

The report emphasizes the fact that for roads serving farmers primarily there is seldom a need for expensive construction and no improvements should be made which will not be repaid fully by enhanced value in adjacent farm lands.

Federal-aid work has progressed rapidly until nearly a third of the entire proposed system has been improved.

Projects in the Federal-aid system completed during the fiscal year 1926 included 2161 miles graded and drained; 627 miles surfaced with sand-clay; 3247 miles surfaced with gravel; 58 miles of water-bound macadam; 553 miles of bituminous macadam; 180 miles of bituminous concrete; 2464 miles of Portland cement concrete; and 78 miles of brick.

These, with bridges aggregating a length of 21.3 miles, make up the total of 9417.3 miles of road completed during the year, or a total of completed Federal-aid roads to date of 52,902.8 miles.

Total cost of roads completed this year was \$206,139,220, of which the Federal Government paid \$90,294,107.

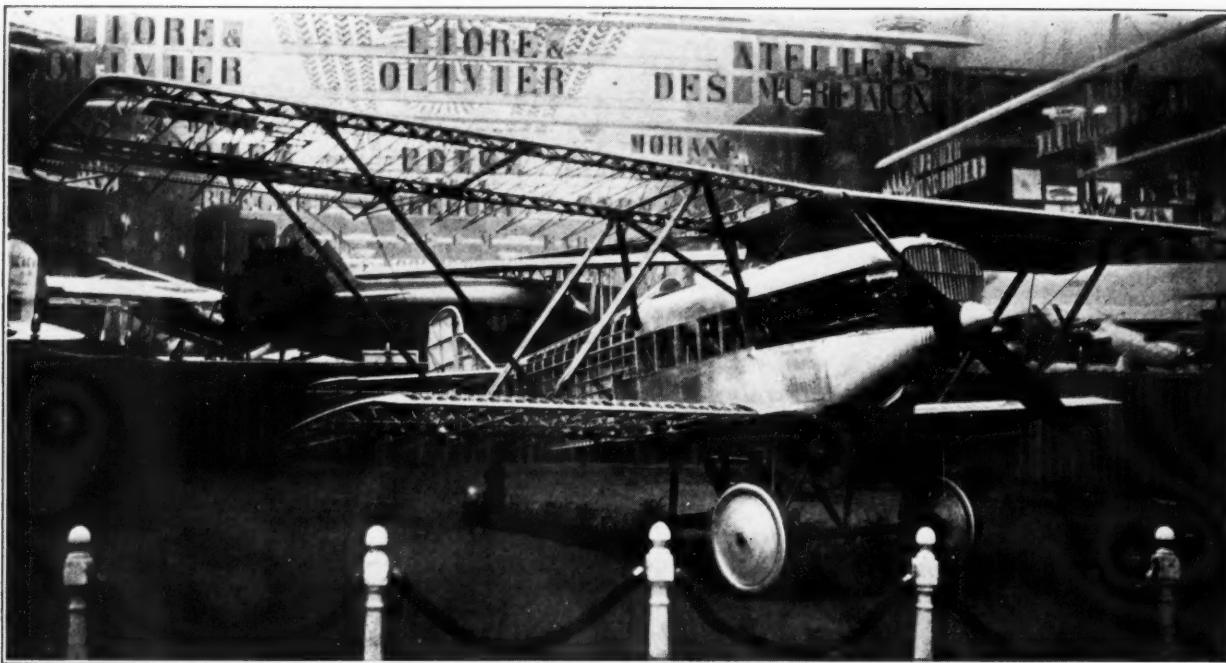
Valve Seat Tester

A DEVICE for testing the seat of a valve before the engine is assembled has been announced by Black & Decker Mfg. Co., Towson, Md. It consists of an inverted cup having a rubber ring at the bottom to make a tight seal with the cylinder head surface around the valve. A pressure gage is mounted on



Black & Decker valve seat tester

the cup and there is also a connection through a check valve to a rubber bulb. In testing the valve seat the cup is applied and held tightly to the surface of the cylinder head. The bulb is then squeezed two or three times to give about 10 lb. air pressure in the cup. The slightest leakage of air past the valve results in a drop of pressure as read on the gage.



Fiat all-metal scout plane with canvas-covered wings in the Fiat inclosure at the Paris aeronautic exposition

Europe Turning to All-Metal Planes and Air-Cooled Engines

Aeronautic development also veering toward monoplane design and greater use of deep-section wings. Seven nations represented at Paris exposition. 173 exhibitors.

By W. F. Bradley

AIRPLANE manufacturers of seven nations participated in the Tenth International Aeronautic Exposition which came to a close in Paris Dec. 19, after running for three weeks at the Grand Palais. To the surprise of even the native visitors, the exposition was dominated by the military element.

After "making the rounds" of the display booths of the 173 exhibitors, the outstanding aeronautical tendencies were found to lie in all-metal construction, the growth of the monoplane, and the greater use of deep-section wings. Not more than three or four machines can be considered all-metal types, but this term generally is applied to machines having a metal framework with the wings covered with canvas and the fuselage covered with canvas or wood, or a combination of canvas, wood and metal.

Under the title Avimeta, the Schneider company has a two-seater scout monoplane in which no fabric is used, the entire plane being constructed of Alferium. Another machine on which fabric is excluded is the Bernard 12 C2, a two-seater scout monoplane.

For some reason or other, some of the most important European machines were not to be found in the Grand

Palais. Thus the St. Nazaire-Penhoet, a giant seaplane now under construction at St. Nazaire, was represented by drawings only. This monoplane, having a spread of 131 ft., a length of 85 ft. and a surface of 2906 sq. ft., is equipped with five Jupiter air-cooled engines of 420 hp. and has a total weight of 18 tons.

The biggest flying boat present was a Narcel Besson thick-wing monoplane entirely of wood construction with the exception of the stays from the central pontoon to the wings, equipped with three Jupiter air-cooled engines mounted in the wing and furnishing a total of 1140 hp. The machine, which has its gasoline tanks in the wings, has been designed to carry 14 passengers in the central pontoon, and in addition has two baggage holds. Its cruising speed is 112 m.p.h., its radius of action 560 miles, its total weight 11,300 lb., its total load lifted 6270 lb. and its commercial load 2970 lb.

A new passenger plane, of which two have been adopted by the Air Union for the Paris-London line, is the LeO21, built by the Loire & Olivier Co. This is an all-metal, fabric covered biplane carrying 18 passengers in a central fuselage—six in front and 12 behind the dual control pilot house. Two Jupiter air-cooled en-

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gines are fitted, and give the machine a maximum speed of 120 m.p.h., with a radius of action of 372 miles. During its acceptance tests the LeO21 showed that it could maintain its altitude on one engine.

Breguet presented the Model 26T as his most important commercial plane, this being a single-engined, all-metal biplane developed from the record-breaking BR 19. The construction is entirely steel and duraluminum, with the exception of the wing covering and the covering for the passenger cabin, this latter having three-ply wood. Although shown with the Jupiter 420 hp. air-cooled engine, the cradle is interchangeable with one receiving the 450 hp. W-type Lorraine-Dietrich, or the 450 hp. Hispano-Suiza. A fireproof partition separates the engine from the pilot house. Under this latter is a baggage hold. The main body of the fuselage comprises an eight-passenger cabin 71 in. high and 68 in. wide. There is a second baggage hold behind the cabin. With a surface of 592 sq. ft., the weight empty is 3000 lb. with Jupiter engine, the useful load is 3210 lb. and the commercial load 1980 lb. Trimmed for a range of action of 500 miles, its ground speed is 125 m.p.h.

Farman Exhibits the F170

Farman exhibited as his only commercial type the F 170, an eight-passenger wood and metal monoplane, fitted with a 500 hp. W-type Farman engine having geared down propeller, and in regular service on the Paris-Berlin line. The machine, with a wing area of 562 sq. ft., weighs 4400 lb. empty, carries a useful load of 2900 lb. and has a speed of 125 miles. Among the features of this machine is the placing of the exhaust pipes on each side of the fuselage, passing above the wings, and exhausting behind the cabin. The radiators are set in a V-section recess in the fuselage, behind the cabin.

An all-metal, three-engine, passenger-carrying monoplane was shown by the S.E.C.M., in the Amiot 150. The machine has not yet undergone its tests, but is declared to be practically completed. Having an area of 1076 sq. ft., the machine is equipped with three Hispano-Suiza engines giving a total of 1050 hp. One engine is in the nose of the fuselage and two are set in the entering edge of the wing, which has a thickness of 47 in. The gasoline tanks are in the wing, between the lateral engines and the fuselage. Designed with a practical range of action of 500 miles, or rather more than 600 miles in still air, the machine will carry 14

passengers and 1300 lb. of freight. Its weight empty is 7100 lb., while with full load it scales 16,000 lb., and has a maximum speed of 145 miles, or a cruising speed of 110 miles on four-fifths power.

Fiat All-Metal Scout Plane

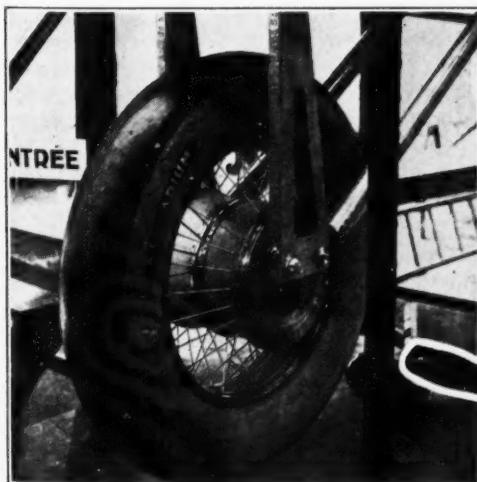
Fiat has produced an all-metal fabric-covered scout biplane of 274 sq. ft. area, equipped with its own 410 hp., 12-cylinder engine, and having a speed of 172 m.p.h. Weighing 2050 lb. empty, it carries a load of 925 lb. and is armed with four rapid-fire guns.

More interest was to be found in the engine section than in the purely aviation division of the show. General features were increased size of units, the development of reducing gears and activity in air cooling. The biggest single engine appeared to be a Lorraine-Dietrich of 3958 cu. in. (12 cylinders of 6.88 by 8.85-in. bore and stroke). Fiat had an engine of 2824 cu. in. (12 cylinders of 6.69 by 7.87-in. bore and stroke).

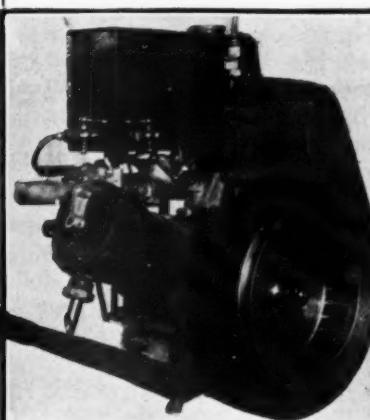
There is undoubtedly a growing movement towards higher engine speeds with geared-down propellers. The Farman type of planetary gear reduction, with bevel satellites, in addition to being used on this firm's engines, is adopted under license by Gnome & Rhone, builders of the Jupiter engine, by the Bristol Co., by B. M. W. in Germany and by the Wright Aeronautical Corp. in the United States.

Lorraine-Dietrich has recently brought out a planetary reducing gear, which is fitted to a 12-cylinder W-type engine of 120 by 180-mm. bore and stroke, and gives a ratio of 1 to 1.545. The normal engine speed is 1900 r.p.m., which corresponds to 1230 r.p.m. of the propeller. This engine has undergone its official French Government tests and has been accepted at 450 hp. at 1900 r.p.m.

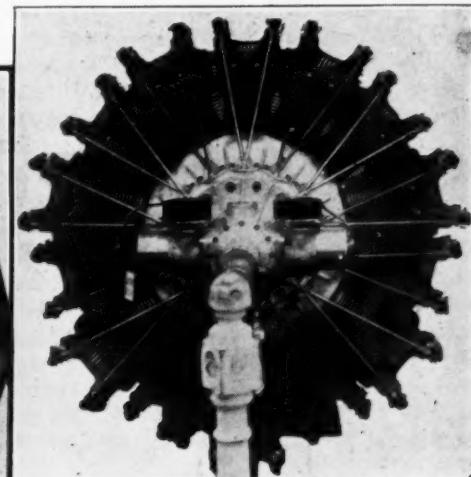
The Lorraine-Dietrich gear is contained within an aluminum housing bolted to the nose of the crankcase, and comprises an internal ring gear centered on the front end of the crankshaft, driving six spur type satellites on roller bearings and turning around a fixed pinion, in the housing. A disk on the propeller shaft forms supports for the satellites, and while the propeller shaft, which is a prolongation of the crankshaft, is on roller bearings, the spigot bearing inside the crankshaft is bronze bushed. Reactions of the propeller are absorbed by a heavy-double thrust bearing continually lubricated. The whole of the reducing mechanism is lubricated under pressure by oil brought through a lead



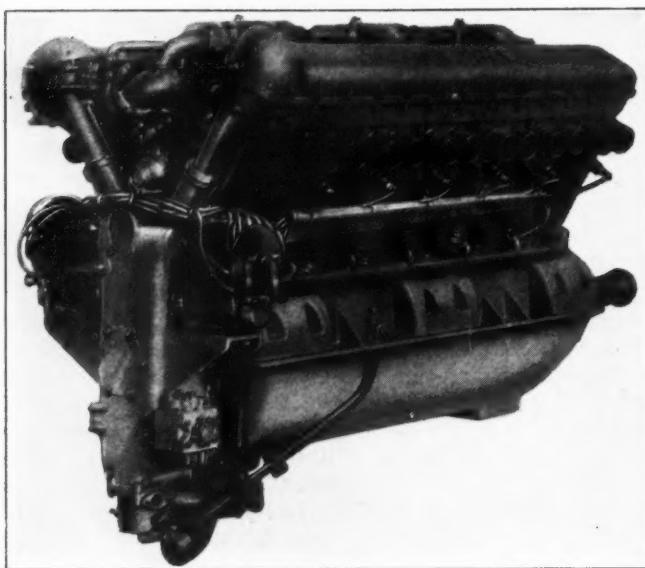
Gnome & Rhone engine starter



Bleriot elastic-hub landing wheel



Lorraine-Dietrich air-cooled engine



Fiat 12-cylinder, 800 hp. engine. It was with an engine of this type that the Italians won the Schneider Cup Race this year

in the crankshaft and the internal ring gear is maintained in a constant level of oil.

Renault is using a spur pinion reduction gear on two of his engines, but unlike the Lorraine-Dietrich and the Farman, the crankshaft and the propeller shaft are in different planes.

Fiat is now in production on three 12-cylinder engines of the same general design, having an international rating of 410, 550 and 900 cc. The cylindrical dimensions are 115 by 150 mm., giving 1130 cu. in.; 135 by 160 mm., giving 1701 cu. in., and 170 by 200, giving 3324 cu. in. A fourth type of engine, as used on the Schneider Cup plane is the 900 hp. type lightened and modified for higher power.

Engines of Four Vertical Valve Type

All the Fiat engines are of the four vertical valve type, with two camshafts in a single housing for each line of cylinders. A vertical shaft at the rear drives the inner of the two camshafts by means of a pair of bevels and the drive is transmitted to the companion shaft by spur pinions. One cam operates a pair of valves through a follower which is placed longitudinally and guided in the camshaft housing. The two ends of the follower are split and receive a hardened adjustable head in contact with the valve stem.

The carburetors, either two or three in number, according to the engine, are in the angle formed by the two lines of cylinders and are distinctive in the method of water jacketing the aluminum manifolds and in the admission of air. The water outlet from the cylinders is passed into the manifolds, and then into a central water pipe uniting the manifolds and leading to the radiator. The carburetors are inclosed at their base by an aluminum chamber with an air inlet on the upper face and through which all the air passes on its way to the carburetors. This chamber forms a trap into which gasoline leaking from the jets or the float chamber is collected and can be led away.

The new 12-cylinder Isotta-Fraschini 420 hp. engine, of 140 by 150-mm. bore and stroke, has a valve gear somewhat similar to that of the Fiat, but the engine is distinctive in having a detachable aluminum head. The carburetors are on the outside and the propeller is driven direct.

The only other Italian engine in the show was the Cappa, built in the shops of the Itala Co., at Turin. This engine, which has a most unusual appearance, for it is a V-section block of aluminum with plugs inserted on each side, and no visible operating mechanism, has been built on the same lines as the Itala 91½-in. racing engines described previously in *Automotive Industries*. It is a 12-cylinder V-type of 1098 cu. in., having a built-up roller bearing crankshaft and geared-down propeller shaft. It is stated to have undergone its official Government 50-hour tests.

Salmson Air-Cooled Engine

While the British Jupiter engine, built in France by Gnome & Rhone, is the one most frequently employed, several other makers have produced air-cooled types. Salmson has just brought out the 18AB 460 hp. star type, of 125 by 170-mm. bore and stroke, most of the parts of which are interchangeable with the firm's water-cooled model. There are two radiating rings of nine cylinders, the second ring being immediately behind the front ring, with the cylinders coupled together, although an air space is left all around them. The rear ring of cylinders is masked by the front set, but it is claimed that the air stream from the propeller and the inter-connection of a front and a rear cylinder assure uniform cooling. The cylinders are steel with aluminum alloy finned jackets. Two valves per cylinder are vertical in the head, with operation by pushrods and rockers, from a set of cams in the front of the engine. The rockers for each pair of cylinders are fulcrumed on the head of the front cylinder, the rockers for a rear cylinder being twice as long as those for the front one. The method of cooling the lubricating oil is by passing it through a jacket surrounding the intake manifolds; this, however, has already been employed on other Salmson engines.

Lorraine-Dietrich, whose activities up to the present have been confined to water-cooled engines, is now out with two air-cooled models, one having seven radial cylinders, developing 220 hp. and the other having 14 cylinders, the second ring being staggered in relation to the front ring. The engines are both overhead valve pushrod types with direct driven propellers.

The Gnome & Rhone Co. has produced an engine starter for use with Jupiter engines, but capable of being applied to any other power unit. Weighing 44 lb. complete, the starter consists of a single cylinder two-cycle engine of 64 by 76-mm. bore and stroke, air-cooled with fan circulation, and a compression cylinder inclined in relation to the power cylinder. A motorcycle type of starter, operated by means of a lever in place of a kick, is used for starting. The compression cylinder supplies carbureted air to the engine by means of a distributor and the starter magneto furnishes current for firing the charge. The unit has the advantage of being suitable for driving an electric generator for wireless, or for operating a small pump for use on flying boats.

A FISCAL system whereby the owners of trucks suitable for military purposes—that is, trucks built according to certain specifications, in series on the interchangeable plan—are exempted from taxation on these trucks, has just gone into force in Italy, through the publication of rules of application of a decree published last year. Only a single company in Italy (Fiat) builds motor trucks, and as hardly any firm would think of producing vehicles that are not tax-exempt, this measure virtually amounts to standardization of truck design.

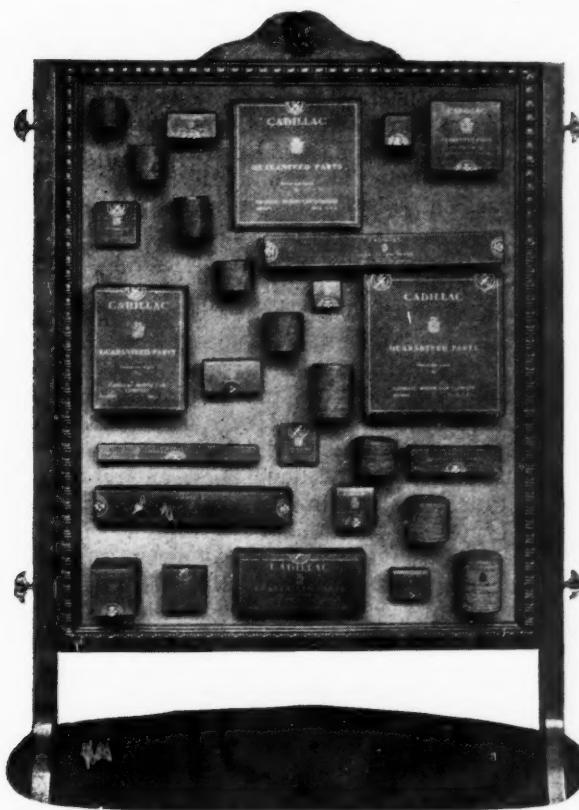
Cadillac Gives Independent Garages 25% Discount on Parts

Increase in this branch of business noted since plan
was adopted. Packaging of parts also an aid.

THE policy of revising the distribution of replacement parts, as announced in recent weeks by a number of automobile manufacturers, whereby attractive discounts are made available to independent garages, is proving a success both from the standpoint of increasing the replacement parts business of the manufacturer and his dealers and also in gaining the friendship of independent garage operators.

The Cadillac Motor Car Co., which adopted the new distribution idea last March on a world-wide basis, has had an excellent opportunity to observe the plan in operation, and, according to W. M. Warner, head of the parts division of Cadillac's service department, the company is more than satisfied with the results.

Besides affording garages the opportunity to secure special discount privileges on replacement parts, the Cadillac parts department has also devoted considerable attention to packaging parts in attractive containers, thereby making it possible for its distributors and dealers to exhibit them in a pleasing manner in their showrooms.



A special display board which Cadillac is providing dealers for the display of packaged replacement parts



Discount card in
leather folder to-
gether with booklet
on how to order
Cadillac parts

Since Cadillac inaugurated its discount plan, discount cards have been issued to more than 2600 independent garage operators, and, according to Mr. Warner, results obtained from the very start have been most gratifying. Increases in the sale of replacement parts have been reported by many Cadillac distributors, some of whom have enjoyed a 50 per cent gain.

Practically all fast-moving small parts sold by Cadillac are now being packaged in attractive black cartons which are designed both from the standpoint of providing attractive displays in the dealer showrooms and also to eliminate much unnecessary work which results in the handling of unpackaged parts.

According to W. N. Lindberg of the parts department, who has had charge of the issuance of special discount privileges to independent garages, a discount of 25 per cent on guaranteed Cadillac parts is extended to such garages as, in the opinion of the Cadillac distributor or dealer and the Cadillac Motor Car Co., are so equipped and are of such caliber and personnel, as will warrant their servicing Cadillac automobiles.

The discount cards are issued for the duration of one year, new ones being issued each January. An interesting feature of Cadillac's leather folder in the inclusion of a small booklet titled "Cadillac Facts" in which the various models manufactured by Cadillac since its inception in 1902 are listed by serial number. Instructions for ordering parts are also outlined along with Cadillac's business policies and an interesting history of the company.

Chromium Plating of Gages and Cams Proves Successful

Coating can also be applied advantageously to many other automotive parts and production tools, according to tests made at Bureau of Standards. Results are outlined in paper.

CHROMIUM plating, as based on experience at the Bureau of Standards, is not a panacea for all plating problems and will not replace all other forms of plating but will serve many purposes better than other metals. In some cases chromium plating will open up new possibilities which are available with other plating materials. These conclusions, with a considerable amount of coordinated data, are the outstanding features of a paper on chromium plating which was presented recently by William Blum of the U. S. Bureau of Standards at the annual meeting of the American Society of Mechanical Engineers.

As the experience and research work covered by this paper have a direct bearing on the wide-spread activity in chromium plating in the automotive industry, the principal features are incorporated in the following digest:

A bright chromium deposit, when tested in the Bierbaum apparatus with a sapphire point and a given load yielded a scratch with a width of about 0.7 micron (the narrowest scratch of any metal thus far examined), while the cold-rolled steel on which it was deposited yielded a scratch about 2.2 microns in width. The great hardness of the chromium, and the fact that this as well as its other properties may be varied by the proper choice of plating conditions, at least justifies its consideration wherever hardness is an essential factor.

Resistance is High

Chromium plate will stay bright for long periods, not only in an ordinary atmosphere but also when exposed to a high humidity, to salt air, to fairly elevated temperatures, to molten tin and zinc, to many laboratory fumes, and to concentrated nitric acid. It is readily attacked and dissolved, however, by hydrochloric acid, and more slowly by sulphuric. This resistance to tarnish therefore justifies its consideration wherever a bright surface is necessary, e. g. on mirrors, even though the reflecting power of chromium is about 2/3 that of silver.

Although chromium itself resists tarnish, it does not necessarily protect an underlying metal such as steel against corrosion, if the steel is anywhere exposed. Thus it may be readily shown that chromium plated steel quickly corrodes at any points where there are pores or pin holes in the deposit. In this respect chromium is similar to nickel and copper, and unlike

zinc and cadmium, which latter will protect small areas of exposed iron because the zinc and cadmium dissolve more readily than the iron. Any superior protective action of chromium plating on steel above that of nickel plating must depend upon producing more nearly impervious deposits of chromium than of nickel. From present indications it appears probable that for such uses chromium will generally be applied over nickel plating of good quality, in which case the chromium is chiefly useful for its hardness and tarnish resistance.

Sargent solution, which is the basis of the present chromium plating development, is a bath of which the major constituent is chromic acid (CrO_3) in a concentration of about 33 oz. per gal. To this is added a small amount (0.4 to 0.7 oz. per gal.) of chromium sulphate, $\text{Cr}_2(\text{SO}_4)_3$. From such a bath, Sargent and others have obtained good chromium deposits, but frequently the results have been erratic. H. E. Haring, from a study at the Bureau of Standards (Chem. Met. Eng. 32, 692, 1925), concluded that in such a bath it was necessary to regulate the acidity. This is accomplished practically by having present in the bath a colloidal suspension of chromium chromate, which may form automatically, or may be produced by the addition of any basic or reducing substance.

Even more important than the exact composition of such a bath, is the control of operating conditions, especially temperature and current density. These have an appreciable effect in all plating operations but in chromium plating relatively small variations in these factors may change entirely the character of the deposit, or even prevent deposition entirely. Three principal types of chromium deposit may be produced, though of course these shade gradually into each other. (1) At too low current density or too high temperature, a "milky" deposit is produced. This is relatively thin owing to the very low cathode efficiency under such conditions. (2) At the appropriate temperature and current density, e. g. at 45°C. (113°F.) and 100 to 200 amp. per sq. ft., a bright deposit is produced. (3) At too high a current density, or too low a temperature, the deposit becomes "frosty," gray and "burnt." Of these deposits, the milky form is the softest, and the bright is the hardest, as measured by the scratch test.

With an appropriate solution, temperature and current density, it is a relatively simple matter to produce

bright, hard deposits of chromium upon nearly plane surfaces, cylinders, etc. Upon irregularly shaped articles, and especially those having deep recesses, it is very difficult to get a continuous deposit of chromium of uniform properties. Thus it may then be found that no metal is deposited in the recess or the deposit on the projecting parts is gray and spongy. The latter type of coating is hard to buff to a bright surface. This poor throwing power of the chromium solution is due principally to the fact that the current efficiency decreases rapidly as the current density is lowered. At 45° C. (113° Fahr.), the cathode efficiency at 200 amp./sq. ft. is about 18 per cent, while at 50 amp./sq. ft. it is only about 7 per cent, and at slightly lower current densities it is practically zero. This limitation appears to be an inherent defect of baths containing chromic acid.

Ordinarily in electro-plating the cost of power is of the order of one cent or less per sq. ft. With chromium, however, the power cost may be from five to 10 times as great. This is due to several factors, especially (1) the low electro-chemical equivalent of chromium in chromic acid in which it has a valence of six; (2) the low cathode efficiency of chromium deposition, generally about 15 per cent, and (3) the higher voltage, generally 8 to 10 volts, required by the use of insoluble lead anodes and high current densities.

Cost is Not Prohibitive

The cost of the chromium itself is not prohibitive, as the metallic chromium in chromic acid at 40 cents per lb. costs about 80 cents per lb. as compared with nickel at 45 cents. A coating as thick as 0.001 in. represents only about three cents worth of chromium per sq. ft. The total cost of chromium plating is certain to be somewhat greater than that of nickel, as the investment, the power, and the labor cost are all higher in chromium plating.

In a recent study at the Bureau of Standards the performance of chromium-plated plug gages was compared with that of hardened steel gages. In these comparisons a wear testing machine was employed. By its use, two gages were automatically moved up and down in hardened steel rings and the wear was measured after a determined number of such gagings. From this study the following tentative conclusions were reached: When exposed to sliding friction, with no abrasive present, the chromium-plated gages resisted wear about five times as well as any of the steels tested. When abrasives such as fine emery were present the chromium-plated surface, while still superior to the steel, was only 30 to 50 per cent better. This latter result does not mean that the chromium plating is unsuitable for resisting wear by finely divided abrasives such as emery under all conditions. Thus it was found in lapping wear tests that the chromium resists wear from two to four times as well as the customary gage steels. It is at least probable that by depositing the chromium under different conditions, coatings may be produced which are best suited to resist each particular type of wear.

In the experiments thus far conducted at the Bureau, a relatively thick chromium deposit about 0.0008 in., was applied, after which the surface was ground and lapped to the desired dimensions, leaving a somewhat thinner coating of chromium on the gage when it was tested. A simpler and more economical procedure, would be to apply a relatively thin chromium layer to a finished, accurately under-dimensioned gage. The latter could then be used directly after plating,

and, after a predetermined length of service during which about half the chromium would have been removed, the remaining chromium could be readily dissolved off and a new coating applied. Whether such a procedure will prove practicable remains to be seen.

A few observations indicate that chromium plating on certain cams is practical and advantageous. On gears, it may be difficult to produce satisfactory deposits in the depressions, and the wear on the teeth is much more likely to detach the chromium coating. On stamping dies or other surfaces exposed to severe impact, it is at least probable that a light chromium coating would furnish little protection against the deformation of a soft steel base. If chromium can be made to adhere permanently to a case-hardened die, it would preserve the details. On dies used in molding plastic materials, the application of chromium will probably be advantageous.

The luster and permanence of chromium plating warrant its consideration for reflectors, especially those that are exposed to sulphur fumes such as in locomotive headlights and flood lights. Even though its reflective power is only about 60 per cent, as compared with 90 per cent for silver, the rapid tarnishing of the silver more than compensates for this initial difference.

When a bright surface is required that is not exposed to severe corroding conditions, the application of chromium directly to steel will be advantageous. Where steel articles are to be exposed to the weather, it will be found desirable to apply a coating of chromium of about 0.0002 in., over a substantial nickel coating of 0.001 in. thickness, or still better over a coating composed of a copper and a nickel layer, or a nickel, copper and nickel layer.

On brass articles where there is little tendency for the base metal to corrode, the chromium may be plated either directly on the brass or on a nickel-plated surface. In the latter case, however, it is essential that the nickel plating should be very adherent, otherwise it will peel during the chromium plating.

Y. M. C. A. Students Building Car

UNDER the direction of William Stahler, instructor, students of the Cleveland Y.M.C.A. Trade Schools have started the construction of a small automobile which will have a speed of at least 60 m.p.h. The machine is to be completed in time for display at the Cleveland Automobile Show, the latter part of January.

The car will have a wheelbase of 72 in. It will be a foot narrower than the average pleasure car. The total weight will be considerably under that of any foreign or American machine. A Le-Roy 15 hp. motor will be used. A body of the speedster type will provide for two passengers and will be built entirely by the students of the trade school. With the exception of the motor, the students are making from their own design all parts going into the machine.

IN a report recently issued by the Royal National Lifeboat Institution of Great Britain, it was stated that the practice of adopting tractors for the mechanical launching of lifeboats was to be extended. At the same time it was stated that some attention was being given to the adoption of a transporting and launching carriage driven by its own motor.

Germany Best Potential Automobile Market in Europe

**Now has fewer cars in proportion to population than any other nation of comparable wealth and standards of living.
Heavy future demand seen as business improves.**

By Edwin P. A. Heinze

GERMANY today has fewer motor vehicles in proportion to population than any country of comparable wealth and progress in the world—which may be interpreted as indicating that she stands at present as the world's best potential market for new sales of automotive products.

In view of her advanced standards of living and her extensive industrial and agricultural development it appears incredible that the total number of automotive vehicles in this close-knitted country with a population of 60,000,000 should amount to not quite 560,000, practically half of which are motorcycles.

This is the more remarkable in view of the fact that Germany's innumerable industrial centers are only short distances apart and that there are comparatively good roads of communication between them.

Considering that the density of automobile distribution in Germany in relation to the population is inferior to that of British South Africa, Holland, Switzerland, Belgium and others, and that the only notable European nation with a still less favorable figure is Italy, it is obvious that Germany should be the largest market in the world at the present moment. In the future there doubtless will be larger markets opening up—for instance when Russia and the Asiatic nations develop better roads—but that time will not arrive for many years.

Statistics for the last year show that Germany has had an increase of only 31,000 passenger cars and not quite 10,000 trucks during that period, but this does not alter the case. It only means that selling is slow. Business in Germany is bad and huge as are the requirements in regard to motor vehicles, everyone prefers waiting for an improvement in conditions before undertaking purchases which involve not only a heavy initial outlay, but also maintenance costs and heavy taxes.

There cannot be the slightest doubt that a boom is coming. Economical conditions have already started on a more favorable course of development.

It is interesting to record that Germany's automotive wants were recognized by American makers almost sooner than by the Germans, for the large American combines started work in Germany immediately after stabilization of the currency in 1923. This happened to be at a time, too, when the German industry, bloated by the inflation boom, was at its weakest. It used antiquated methods of operation and backward designs. Besides, it was in general disfavor with the dealers and the public, who were not willing so soon to forgive and forget the hard business conditions that were imposed on them and the haughty, off-hand attitude which some executives had chosen to adopt during the inflation period.

For these reasons American cars sprung immediately into great favor and American methods of manufacture took such hold on the public imagination that a regular "American craze" ensued. This was the strongest incentive to the German industry to veer 'round and reorganize, which it did in the subsequent years after being granted a period of respite by the adoption of the

customs tariff now in force—not, however, without previously having a hard tussle with the dealers' organization, which wanted the German Government to refrain from protective measures.

The last two years have been very difficult ones both for the German industry and for the importers, despite the opening of numerous banks to finance deferred payment sales, among them being branches of well-known American institutions.

Since 1925 the number of makers of passenger cars has decreased from 49 to 30, that of truck builders from 34 to 22 and of the motorcycle makers only 17 are left. But the remaining German works managed to

GERMAN registrations of passenger cars and trucks in 1926 were 439 per cent more than in 1914, and they have increased almost 100 per cent during the period from 1923 to 1926, inclusive, according to figures recently furnished by the U. S. Bureau of Foreign and Domestic Commerce.

Specifically, the 1923 registration figures showed a total of 152,076 units, while the figures for the first half of 1926 showed 301,267, all figures being exclusive of tractors, motorcycles, motor bicycles, fire trucks, and street cleaning equipment. There has been an unusual steadiness in the augmentation of passenger cars and trucks during these years, the period between July 1, 1924, and July 1, 1925, however, being slightly higher in registrations than the other two fiscal years.

reorganize their production methods and improve their designs thoroughly in this period.

The great slogan in everyone's mind in 1924 and 1925 in Germany was "mass production" as in America, and the Germans made a close study of American production and business methods, which they adapted to their own needs. In order to cut down overhead expenses and to avoid unnecessary competition quite a number of fusions, direct and indirect, took place, one of the outstanding ones being that of the two old rivals, Daimler and Benz.

Not Ready for Mass Production

But only a few makers went as far as to organize a mass production along anything like American lines, and the country being for the time unable to absorb really large quantities, these organizations had to remain in a more or less rudimentary state, awaiting the boom that should call them to full life.

This reorganization, together with the slump in the market, necessitated great sacrifices on the part of the German industry. Nevertheless, an immense amount of costly labor has been devoted to bringing designs up to a level with those of France and England. The progress made has been clearly demonstrated in the national automobile shows held each year at Berlin, and it has been quite remarkable. Undoubtedly Germany has been greatly influenced by American designs, but the general economical conditions are similar to those in other European countries and therefore we find great attention being bestowed to the development of small, high-efficiency engines, though lately a tendency for higher volumes has cropped up.

Taking the situation as a whole from the American point of view, it cannot be regarded as favorable to American exports. At present trade is lying low and everything is more or less in a state of stagnation. As soon as this alters, there is sure to set in a great demand for motor cars of all kinds, but this demand can to a very great extent be met by the German industry with vehicles specially designed for German requirements at competitive prices and qualities.

Very cheap American products, especially those being built and assembled in Germany, will doubtless command comparatively good sales, but they will certainly not be as much in demand as they would have been two

WHILE repeated efforts to obtain the percentage of registrations by nationalities for all Germany have been made, they have all been unsuccessful. The only district for which such figures are available is the City of Berlin, which by its nature as a capital, an industrial, and a residential city, should be representative. These figures for the current year are tabulated as follows:

New Registrations of Automobiles in Berlin By Nationalities—First 6 Months of 1926

4002 units	or	69.7% German
783	"	13.6% American
300	"	5.2% Italian
276	"	4.6% French
194	"	3.4% Austrian
71	"	1.4% British
49	"	0.9% Belgian
66	"	1.2% not known

5741 **100.0%**

Figures furnished by U. S. Bureau of Foreign and Domestic Commerce.

years ago if the great deflation crisis had not set in. Doubtless, too, the German industry will take further and more effective steps to boom "home products," which will be felt especially in the medium-sized passenger car field. In view of this, American makers should let no opportunity pass to strengthen their sales and service organizations in this country.

ACCORDING to a recent report of the National Conference on Street and Highway Safety, the total number of deaths from automobile accidents in the United States during 1925 was 21,627. This total does not include fatal accidents in which automobiles were involved but which are charged against heavier vehicles, such as steam or electric rail cars.

Based on a total motor vehicle registration of 19,857,915 in 1925, this represents one fatal accident for every 918 automobiles in operation during that time. More fatal accidents occurred in New York than in any other state, but New York also has considerably more vehicles in operation. The per-vehicle accident rate was higher than the average, however, being 731 vehicles per death. Florida had the highest proportion of fatalities compared with the number of automobiles in operation—the rate for this state being 597 cars per death.

In Iowa an average of but one car in 2190 figured in a fatal accident and the conference offers this fact as evidence that fatal accidents are preventable, to some extent at least, and a constantly increasing number of vehicles in operation does not mean necessarily that fatal accidents must also increase in like ratio.

THE first sanctioned motor vehicle show in Germany after the war to which the products of all countries will be admitted will be held at Cologne, May 20-27, 1927. The show will be confined to commercial vehicles and will be international.

United States Exports of Automotive Vehicles to Germany, 1914 to 1925, Inclusive, and the First Six Months of 1926

	Passenger		
	Cars	Trucks	Total
1914	1411	24	1435
1915	16	4	20
1916-1919	—	—	—
1920	47	37	84
1921	1	22	23
1922	46	24	70
1923	64	3	67
1924	2347	47	2394
1925	3623	549	4172
1926			
(First 6 Months)	1252	702	1954

Figures furnished by U. S. Bureau of Foreign and Domestic Commerce.

NEW DEVELOPMENTS—Automotive

Electric-Drive Grinding, Buffing and Polishing Machines

A COMPLETE line of motor-driven, double-end grinding machines, of buffing and polishing machines with open spindle extensions and of buffing and polishing machines with incased spindle extensions has been announced by the Hisey-Wolf Machine Co., Cincinnati, Ohio. The floor-stand grinder, illustrated herewith, is furnished in five sizes, to take two wheels of the following dimensions: 7 by $\frac{3}{4}$ in.; 10 by 1 in.; 12 by 1 $\frac{1}{2}$ in.; 14 by 1 $\frac{1}{2}$ in., and 14 by 2 $\frac{1}{2}$ in. The three smaller sizes are made also with bench base mounting.

Floor-stand buffing machines with open spindle extensions, as shown at the left in the illustration, are also made in five sizes, each for two buffing or polishing wheels of the following dimensions: 8 by 1 in.; 10 by 1 $\frac{1}{2}$ in.; 12 by 2 $\frac{1}{2}$ in.; 14 by 3 in., and 18 by 3 in. The two smaller sizes are made also with bench base mounting. Floor-stand buffing machines with incased spindle extensions are made in four sizes, each taking two buffing and polishing wheels of sizes corresponding to the four larger sizes of wheels used with the open spindle extension machines. Only the smallest of these buffing machines with incased spindle extensions is made also with bench base mounting. All of the machines are available in both direct current and alternating current types.

Single-phase alternating current machines are equipped with commutating type repulsion induction motors, which—unlike the old type split-phase motors—have no dragging centrifugal switch. It is claimed that they will start and pick up speed under any load of less than twice their rated capacity, and that the starting current is unusually low. Two and three-phase alternating current machines are equipped with motors of squirrel-cage design.

Bearings of the ball type are mounted in heads close

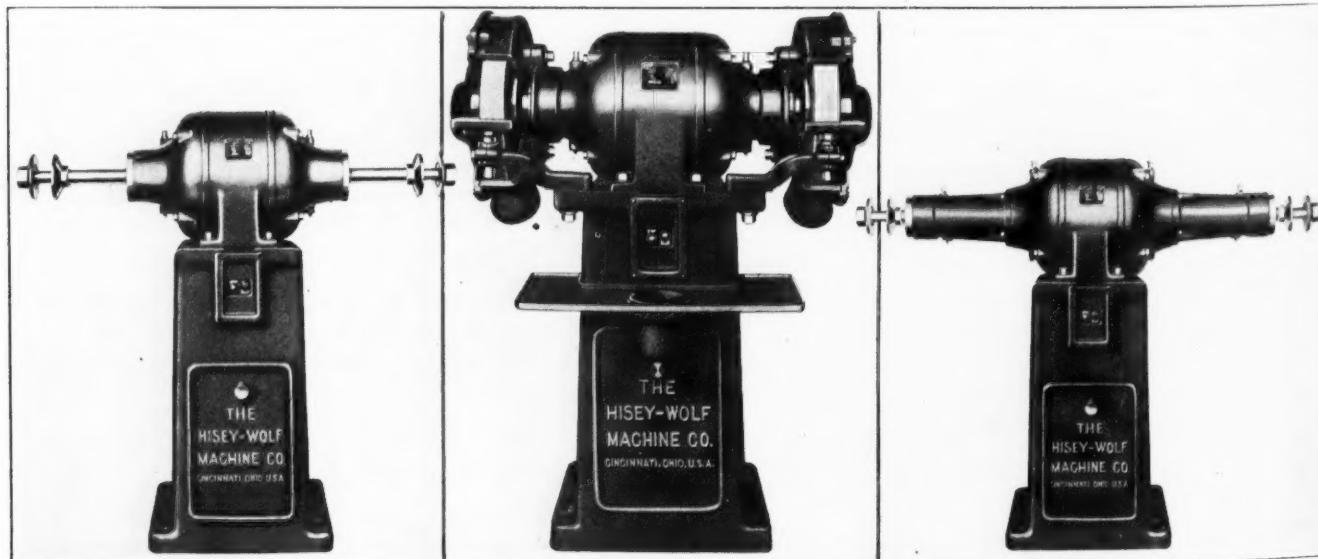
to the wheels. Buffing and polishing machines with incased spindle extensions are equipped with four ball bearings. All bearings are completely inclosed and protected from dust and grit. It is recommended that all bearings be filled to overflowing with a good grade of oil once every two or three months. The oil chambers are provided with suitable flush plugs to permit of an occasional cleaning.

A motor starter with push-button control is standard equipment on all models. Starting and switch equipment is in accordance with the standards of the Electric Power Club, and the grinding wheels are of such diameters as to give peripheral speeds within the safety limits recommended by the American Engineering Standards Committee. Wheel guards are of the full safety combination pattern, being adjustable with wear of the grinding wheel, and also permitting angular adjustment with the same protection.

Motor-Driven Tool-Room Grinder

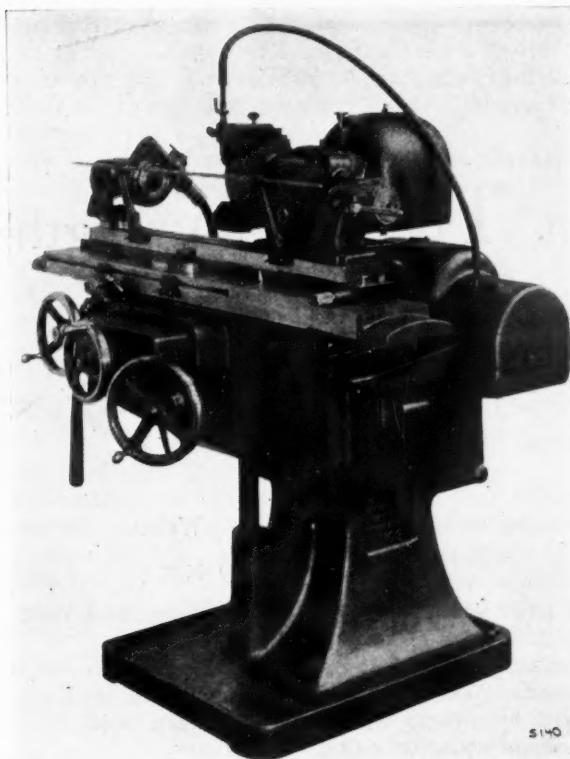
A MOTOR-DRIVEN No. 3 universal tool-room grinder is announced by the Oesterlein Machine Co., Cincinnati, Ohio. The 1 hp. motor for the wheel head drives through a flexible coupling, intermediate gears and helical gearing to the spindle. The intermediate gears provide two-wheel speeds. The wheel head motor is mounted on the column, so that the entire unit may be swiveled 90 deg. in either direction.

The machine is equipped with automatic power feed and water supply. Pump, power feed and workhead are driven from an inclosed motor at the rear of the machine. Three workhead speeds are provided, power being transmitted from the gearbox through a flexible shaft and a worm and worm wheel to the workhead spindle. Three rates of automatic table feed are available, power from the geared feed box passing



CENTER: Hisey floor-stand grinder. LEFT: Buffing machine with open spindle extensions. RIGHT: Buffing machine with incased spindle extensions

Parts, Accessories and Production Tools



Oesterlein No. 3 motor-driven universal tool-room grinder

through a telescoping universal joint shaft to the table feed mechanism in the knee.

In addition to the three rates of automatic table feed, three means of hand reciprocation of the table are provided, consisting of a high and low ratio table feed by means of a hand-wheel and a lever feed that is used for quick, short-stroke reciprocation of the table. Aside from the drive features the machine is largely identical with the No. 3 belt-driven and the No. 2 belt-and-motor-driven grinders made by the same company.

Flexible Axle Chassis

A NEW car will shortly be built in Montreal, Can. The automobile is similar to other cars with regard to motor power but it has a new type chassis, and will be known as the Wright Flexible Axle Automobile. The solid axle principle is done away with and instead springs are used. It makes no difference what angle the car is riding on, the body remains on the same level. The price for a small four-cylinder open model is to be \$450 and for a six-cylinder model \$1450.

New Aluminum Process Found

A NEW process for coloring and finishing aluminum, to protect the aluminum from oxidation and corrosion, has been discovered by German chemists, a cable to the Department of Commerce from Trade Commissioner Pilger at Berlin states. Forty-

six per cent of the country's output of aluminum is used in the automotive industry.

The process, according to the report, consists of dipping or boiling the aluminum article in baths containing solutions of copper, zinc, tin and other metal alloys, covering a range of approximately 80 different colors and shades, further variations in effect being furnished by polishing the aluminum before immersion, polishing the coating afterward, brushing the finished surface with a thin coat of wax and other methods. No electric current is used and there is no metal plating on the aluminum, but an actual amalgamation of the outer surface is claimed.

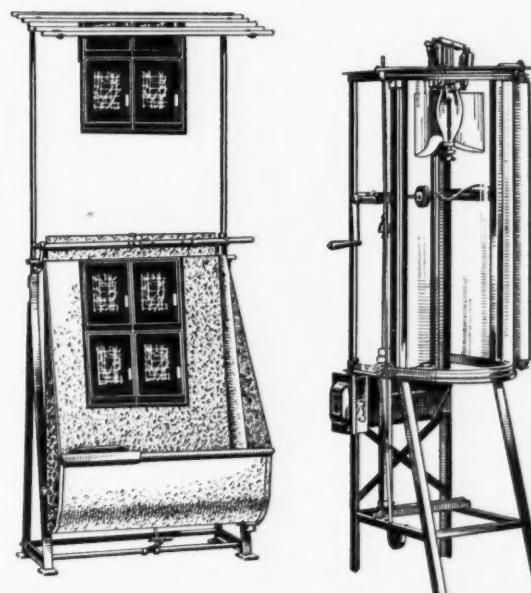
Pease "Junior" Blue-Printing Machine

A RECENT development of the C. F. Pease Co., Chicago, is the Pease Junior blue-printing machine which has been designed particularly for use in drafting rooms where only a small amount of blue-print work is required or for emergency use when larger machines are busy on other work.

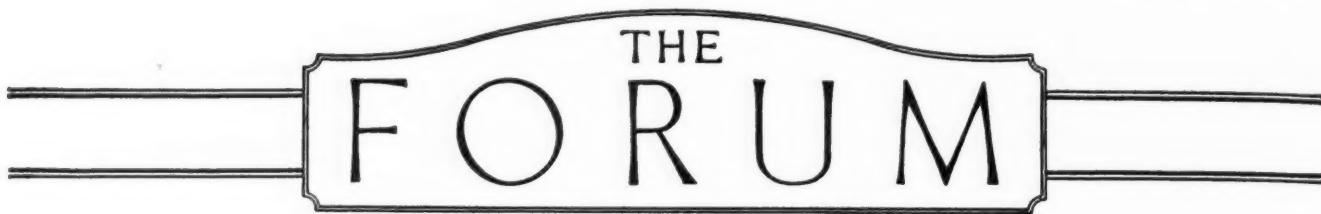
The machine consists of a half-cylinder of glass mounted in a metal frame coated with acid-proof paint.

The tracing and blue-print paper are held in contact with the glass by means of a curtain mounted on a spring roller. A Pease, Type P arc lamp, consuming $7\frac{1}{2}$ amperes on 220 volts D.C. or A.C. and 10 amp. on 110 volts is provided with an aluminum reflector.

The drop of the lamp is controlled by the patented Pease oil control and is provided with a quick break automatic switch to cut off the lamp at any point in its travel. With clear tracings, using a 220-volt lamp, a 24 by 36 in. print can be made in one minute with one drop of the lamp. With a 110-volt lamp the time consumed in making a print is about $1\frac{1}{2}$ minutes.



Pease "Junior" blue-printing machine



Some Additional Light on Torsional Strength of Front Axle Sections

Number of formulae have been developed for torsional resisting moment of I sections, and results given by these are compared.

Editor, AUTOMOTIVE INDUSTRIES:

In *Automotive Industries* of Sept. 30, 1926, there appeared a discussion on torsional stresses in I-section front axles due to twist of the front wheel brakes, and the torsional strength of an I-beam was also mentioned. Having made an investigation of this matter for a well-known motor car concern, I wish to add a few facts to the discussion, which I believe to be of general interest, and also to give a few references to the literature of the subject.

In the above-mentioned discussion, P. M. Heldt refers to Kent, tenth edition, page 371, and Chas. R. Harrman is supposed to have based his discussion upon Hutte. According to Hutte, instead of using the constant (2/9) in the equation.

$$M = (2/9) \times w \times t^3 \times s,$$

Saint Venant recommends using the reciprocal of

$$3 + \frac{2.6}{4.5 + (w/t)}$$

(See also Bach, "Elastizität und Festigkeit," sixth edition, page 317.) For instance, for a cross section 1 in. wide and 4 in. deep the original formula gives $(8/9)s$, while Saint Venant's formula gives $1.13s$, which is a rather large difference.

In order to throw further light on the subject I wish to refer to a German book, "Die Lehre der Drehungsfestigkeit," by Diplom-Ingenieur Const. Weber, published by the Verlag des Vereines deutscher Ingenieure in 1921. The last few pages of this book give, in tabulated form, the results of scientific research along this line obtained in Germany prior to 1921. These pages can be understood by any one interested, and the book is cheap.

Let us compare Hutte and Weber and use the above-

mentioned section of 1 by 4 in. Weber's formula—

$$M = (1/3) (t^3 \times w - 0.63 \times t^3) \times s$$

gives $1.123s$, or only very little less than Saint Venant's formula.

Greater differences arise, however, when we consider I sections. The only I section considered in Hutte is one with a uniform thickness t and sharp inside corners, its moment equation being

$$M = (1/4.5) \times t^3 [h + 2(w - t)] \times s,$$

where h is the height and w the width of the I beam. In other words, Hutte claims the same value as for a rectangular cross section of the same thickness and area.

Weber, on the other hand, considers two cases, one being that where the thickness t is uniform throughout and the fillet radius is equal to t . For this case the moment equation is

$$M = (1/3) \times l \times t \times s,$$

where

$$l = h + 2 \times w - 1.2 \times t.$$

In other words, Weber gives the same value as for a simple rectangular section of the same thickness but somewhat higher than Hutte.

The second case considered by Weber is that of an I section having flanges thicker than the web and a corner radius equal to the thickness of the flange. For this case the equation becomes

$$M = (1/3) \frac{t_f^3 (2w - 1.26t_f) + t_w^3 (h - 1.67t_f + 1.76t_w)s}{t}$$

where t_f is the thickness of the flange, t_w , the thickness

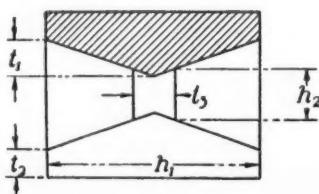


Fig. 1

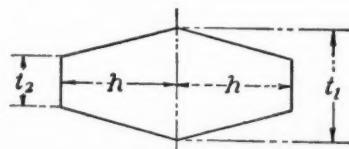


Fig. 2

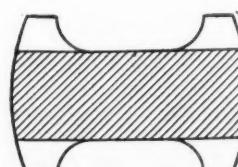


Fig. 3

of the web; h , the height and w the width of the I section.

A comparison of these two formulae with Hütte is interesting and reveals that for an I section of uniform thickness of web and flanges the resisting moment can be calculated by adding the partial moments. A front axle section, however, is never of uniform thickness, the flanges having a draft angle of from 5 to 15 deg., as shown in the sketch Fig. 1. If the radius of the fillet between web and flanges is small, such a section can be calculated with sufficient accuracy for practical purposes as follows:

Determine the dimensions indicated in the section. The moment of what may be called the base is then, according to Weber,

$$M = \frac{\frac{1}{12} + \frac{h_1 (t_1^4 - t_2^4)}{t_1 - t_2} - 0.21 t_2^4}{t_1} s$$

By taking this moment twice and adding the moment of the web (also according to Weber) we get

$$M_w = \frac{1}{3} \left(\frac{s}{t_2} \times h_2 - 0.63 \times \frac{s}{t_2} \right) \times s$$

for the moment of the whole section.

The equation for the torsional deflection of an I beam of uniform section can be worked out in the same way. In the case of an I section with upper and lower flanges of different dimensions, the moment for each flange is worked out separately and the two are added. The base of a front axle section may be of the shape shown in Fig. 2. The equation then becomes—

$$M = \left[\frac{1}{6} \times \frac{h (t_1^4 - t_2^4)}{t_1 - t_2} - 0.21 (t_1^4 - t_2^4) \right] \times \frac{s}{t_1}$$

If the I section of the central part of the axle is caused to merge gradually into a round section, the section at a certain point will be of the form shown in Fig. 3. Here the cross-hatched rectangular center section evidently predominates, and the total resisting moment is found by first determining that of the central section, then that of each of the four trapezoidal corners, and then adding four times the latter moment to the moment found for the central section. Generally the part of greatest width must be given the greatest consideration when dividing up the section for the purpose of calculating the resisting moment to torsion.

In conclusion I wish to refer to a book on "The Strength of Materials" by John Case, published by Longmans, Green & Co., New York, in 1925. Mr. Case develops in this book a new method for the calculation of the torsional strength of irregular sections and gives some tabulated material of great help in connection with the application of his somewhat complicated method.

HUGO MOREN.

Australian Used-Car Plan

Editor, AUTOMOTIVE INDUSTRIES:

I am much interested in the article in the Oct. 14 issue regarding the Windsor plan in relation to traded-in cars. We have adopted in the State of Victoria a similar method which, after some months experience, we find a success.

After many discussions on this subject, we came to the conclusion that there is no greater problem in used car dealing than there would be in handling new cars if the latter were purchased at a price exceeding their selling value. We then set out to educate the dealer, pointing out to him that his second-hand cars, when

sold, should show him a profit. Having developed his mind along these lines, we started a weekly circulation, disclosing prices obtained for second-hand cars by public auction by members of this chamber. For several months we have been issuing this weekly selling list, showing just what prices have been obtained for second-hand cars, reminding dealers that the prices obtained include selling cost, reconditioning and so forth. For instance, a list shows name of car, year's model, an index of its mechanical condition and price obtained. When the purchaser of a new car asks what the dealer considers an over-inflated value, he, the dealer, produces our weekly list, showing the prospect that his estimated value is wrong; and we are informed that these figures usually convince the prospect of his error and he accepts a price or allowance fair to both parties.

While in the State of Victoria this plan has been adopted with success, it has not yet been tried out in the other states and the opinion is expressed that Victoria, in comparison, has almost solved the second-hand car problem.

Twelve months ago, the traders expressed favor regarding a scheme to form a co-operative second-hand trading company. Six weeks ago the proposal was revived and turned down for the reason that the individual second-hand car departments are now so satisfactory that our traders preferred to keep and maintain their own second-hand car departments.

Our experience convinces us that the so-called second-hand car problem is now one of the past because dealers know the market value of traded-in cars through being informed of prices obtained by their fellow traders.

H. W. HARRISON, *Secretary,
Chamber of Automotive Industries,
Melbourne, Australia.*

The Merits of Super-Expansion

Editor, AUTOMOTIVE INDUSTRIES:

The article in the Nov. 18 issue entitled "Engine Efficiency Gain of 20 Per Cent Now in Sight" should be of vital interest to every automobile manufacturer and engineer having the conservation of fuel in mind. Increasing the compression approaches the Diesel cycle, the high efficiency of which is primarily dependant on the high compression before ignition.

The method of increasing thermal efficiency by a more complete expansion of the gases during the working stroke, according to your calculations, does not give the increased overall efficiency that one familiar with prime movers might expect. Cutting off steam at one quarter of the piston stroke in a single-cylinder engine, instead of carrying the initial pressure during the whole piston stroke as was done before Watt introduced the cut-off, increases the frictional surface per unit of steam introduced about 300 per cent, yet increases the thermal efficiency so much that this feature alone revolutionized steam engine design, even though such an improvement did not take place until the steam engine had been in use about 100 years.

If your calculations showing the increase of friction varies as the cube with an increase of piston displacement are correct, then on the same basis, compound, triple and quadruple expansion steam engines would be less efficient than single cylinder prime movers using steam for the working gas. As a matter of history the same argument, and probably the same figures, were presented to the Engineering Board of the U. S. Navy, to show the fallacy of compounding steam engine cylinders.

ders to cut down the steam consumption per unit of output.

An eight-cylinder 3 by 5 in. automobile engine has 41 per cent more piston rubbing surface than a four-cylinder engine of the same stroke and a 12-cylinder has 76 per cent more than a four, but I do not believe any one claims the friction increases in the same proportion, let alone as the cube, for the low efficiency of a multiple cylinder must arise from the increased surface for heat absorption per unit of piston displacement.

Your computations on the hypothesis you assume are no doubt correct, but a certain professor showed mathematically that a steamship could not carry enough coal to propel itself across the Atlantic.

I have never seen any results from tests that corroborate your conclusions, while on the other hand descriptions of engines obtaining a more complete expansion of the gases during the working stroke, even with complicated mechanism, show according to published reports in *Automotive Industries*, a much higher efficiency than we obtain from the ordinary automobile engine.

The thermal efficiency of the first tandem double-acting complete-expansion engine, even with the extra friction of three stuffing boxes and the extra heat-absorbing surface of a piston rod in three combustion chambers, and the inaccuracies of the first engine, and a piston speed of but 600 ft. p. min., was between 28 and 29 per cent, just a little less than that of a Diesel of equal capacity.

The Atkinson gas engine to which you refer with its slow speed, heavy weight per horsepower output, its compound crank mechanism and multiple bearings, according to Donkin or Clerk, was the most economical internal combustion engine that had ever been built and tested up to that time. Such results can be attributed only to the greater expansion of the burning gases during the working stroke.

In practice, to get the best efficiency from an engine which closes the intake valves before the end of the suction stroke, which you describe, the cut-off should be about 0.7 of the piston stroke or travel during ejection, to get a terminal pressure of 21 to 23 lb. absolute when the exhaust is opened, to give the most horsepower per B.T.U.

With such a cut-off the exhaust valve opening may be prolonged to 170 deg. of the working stroke which, of course, adds area to the diagram, and the temperature of the gases at the time of release is about 1200 deg. Fahr. lower than that of the conventional automobile engine at full load.

While I know that text books state that the extra friction of a greater displacement overcomes the gain of a more complete expansion, as far as I can learn such promulgations are entirely hypothetical and no tests have ever been made to corroborate such statements.

As there seem to be no facts or results of tests to disprove the possibilities or the possible gain of a more complete expansion engine, would it not be well for those who are working on the conservation of fuel to make such tests and settle once for all the value or inefficiency of such a cycle.

C. E. SARGENT.

Mr. Sargent evidently is considering operation under full load only, and it was shown in the article that under full load conditions super-expansion of 100 per cent would result in a net gain in power and economy of

practically 7 per cent. But automobile engines are very rarely driven under full load. The normal load in city driving—and in country driving at legal speeds on the level—is usually less than 20 per cent of full load, and under these conditions the gain vanishes.

Mr. Sargent in his communication makes reference to the professor who is supposed to have predicted that steamships would never cross the ocean. The writer has always regarded this professor as a legendary character, exceedingly handy in certain kinds of argument. If he actually lived and made the prediction ascribed to him, he certainly made a great mistake, but that does not prove any other prediction of negative results or failure false, any more than the history of Standard Oil or General Motors proves that any new commercial enterprise will be a great success. Each case must be considered entirely on its own merits.

The comparison between the rubbing surfaces of four-cylinder and eight-cylinder engines of equal displacement is not logical. It is not cylinder number but ratio of expansion which is under discussion, and the two things are absolutely unrelated. To get increased expansion the cylinder dimensions must be increased, and the only logical plan is to increase bore and stroke equally. When this is done it will be found that the friction loss increases substantially as the piston displacement, or as the cube of the linear dimensions.

Taking the example cited by Mr. Sargent, of an eight-cylinder 3 by 5 in. engine as compared with a four-cylinder 4.24 by 5-in., if the pistons were made of the same length in both cases the rubbing or bearing surface would be substantially 41 per cent greater in the eight-cylinder. In each cylinder of the four the bearing surface would be also about 41 per cent greater than in each cylinder of the eight, and since the total gas pressure on the piston in the four would be 100 per cent greater and the inertia force even more than 100 per cent greater than in the eight, it is certainly illogical to increase the bearing surface of the piston only 41 per cent. For equal life it would be necessary to make the piston of the four longer than that of the eight, even though the strokes of both pistons are the same, and his would alter the ratio of rubbing surfaces.

It is hardly fair to compare the present standard type of automobile engine with a steam engine working without cut-off, which discharges steam to the atmosphere at boiler pressure. When the gases of combustion in the automobile engine are discharged into the atmosphere they already have been expanded to about four times their initial volume.

That super-expansion does not possess particular merits for automobile operation is indicated, moreover, by experience. Compound internal combustion engines have been built at various periods in automobile history. One in particular was used as the motive power of a car known as the Compound, which was manufactured at Middletown, Conn., for a number of years and then disappeared from the market. Of course, the failure of the company may have been due to other reasons than that it made its engines compound.

Even before this there was a compound internal combustion engine, built in France by Roser-Mazurier, the history of which also is very brief. In those days, of course, the great cry was for more power from an engine of given weight, in which respect the compound engine is decidedly at a disadvantage.

For engines operating with a comparatively large power factor a moderate super-expansion certainly has merits.—P. M. H.

EDITORIAL

Future World Transport Meetings

SOME measure of disappointment at the very complete dominance by the United States of all of the World Motor Transport Congresses yet held is voiced by Johannes Buschmann, president of the German Motor Car Salesmen's Association, in a recent communication. "The program of the first Congress," Mr. Buschmann says, "was arranged very smartly and systematically by the American founders. It was not based upon international agreement, but upon a one-sided invitation of the Americans resulting in almost all the reports being delivered by Americans. . . . It became evident that there was an intention to force upon the participants in the Congress specifically American ideas and experiences in the line of motor traffic."

Then Mr. Buschmann goes on to make approximately the same criticism of the second Congress held here last year and of the program of the third Congress which begins week after next in New York. "The International Congresses for Motor Transportation," he believes, "threaten to become a private affair of the Americans, a result to be regretted because of their importance." He urges that the scene of the Congress be rotated from country to country as are many world conferences of scientific societies and suggests that the Bureau Permanent International des Constructeurs d'Automobiles—of which the National Automobile Chamber of Commerce has become a member—broaden its activities and become a forum for the discussion of international problems related to motor transportation.

That Mr. Buschmann's ideas have some merit can scarcely be denied. While dominance of the Americans in promoting, planning and conducting the first few of these Congresses undoubtedly was necessary if such a movement were to be given sufficient impetus to amount to anything, it may be reasonable to suppose that a more international flavor in the site of the Congress itself, the planning of the program and the ideas dominating its conduct might work to the best interests of all concerned in the long run.

Hoover Looks Ahead

AT a time when every magazine and every newspaper is bulging with speculations about the course of business in 1927, further prognostications are almost supererogatory. Special emphasis may well be placed, however, on the statement made by Herbert Hoover, because its author, both by virtue of his official position and his personal qualifications, probably speaks with as much

authority and as little bias as any business leader in the country.

Perhaps the most pertinent paragraph in Mr. Hoover's pronouncement is the following:

"Combining all foreign and domestic tendencies with which we enter the New Year, while some of them are not so good as we could wish, others are most hopeful. To those who are interested in the movement of the business cycle, it is worth remarking that we have had no inflation in commodities as prices have decreased rather than increased during the year. Moreover the elasticity of credit through the Federal Reserve System, the absence of undue stocks of commodities, the greatly enlarged information services of the country and wider understanding (and thus better common judgment and caution) all are protection against violent movements, such as we experienced in former times."

Buses vs. Trolley Cars

REPRESENTATIVE bus men more and more seem to be asking a full and complete consideration of the bus as a transportation agency on purely economic and service grounds, whether such consideration be to the disadvantage of some existing transportation agency or not. Coordination with existing agencies is desired, but bus interests apparently are beginning to oppose more strenuously than in the past the idea that buses should be used only when rail and electric lines can be proved to be unprofitable. Demand is being made that buses be considered for use in every place where buses profitably may render a better service than the rail carriers.

The statement made recently by John A. Ritchie, president, Chicago Motor Coach Co., urging that buses be used to replace surface cars in Chicago, is a striking example of this growing attitude. Mr. Ritchie makes no quibble about his stand.

"Transportation agencies are entering a new era," he says. "Tying up the streets with tracks is just going to clutter up the situation, but the bus, by its flexibility, can fit into any scheme ultimately worked out."

That statement, it would seem, joins the issue clearly so far as the particular city is concerned. Whether the future is to see more cases with this same issue clearly drawn or more in which bus interests content themselves with trying to fit in where the existing rail lines admit they can be used remains to be seen. It is interesting to note, at any rate, that this single proposed Chicago installation, should it go through, would mean the sale of two-thirds as many buses as now are owned by all the street railways in the country.

AUTOMOTIVE
Philadelphia, Pennsylvania

**NEWS
SECTION**

INDUSTRIES
Thursday, December 30, 1926

Early Year Factory Activity Rests on Retail Development

PHILADELPHIA, Dec. 30—Tentative production schedules laid out by the leading automobile factories for the early weeks of 1927 indicate that no effort will be made to increase dealers' supplies, which are generally considered ample for the season. The exceptions are several companies that are bringing out entirely new lines of cars and whose dealers have been cleaning out stocks of former models in the last two months.

Attention is focussed on the national automobile show in New York, which will have, aside from improved lines, at least 12 new chassis models, rather more than in any of the recent shows.

Although the trend toward colors remains uninterrupted, and will be accentuated next year by a larger number and variety of sport models, chassis refinements will be stressed by the makers, and there is observable a tendency to increase car speed, not because a high range is particularly desired but because of the smoother and quieter operation at comfortable touring speeds.

A feature of the new displays will be a number of fine small cars, combining the appointments and high grade engineering of the more expensive models with ease of handling in crowded sections. Several new eight-cylinder lines will be introduced at moderate prices.

Used cars stocks are heavy, and drawing more attention than ever from the manufacturers. A system of used-car merchandising known as the Windsor plan is being tried in several American cities. It has been approved by most of the factories and its advantages laid before the dealers.

Studebaker Corporation Elects Four Directors

SOUTH BEND, Dec. 24—Four new directors were elected to the board of the Studebaker Corp. of America at a special meeting this week to fill vacancies caused by resignations. The new members are John F. Harris, Harris, Winthrop & Co., New York; E. N. Hurley, Hurley Machine Co., Chicago; W. G. Warden, Pittsburgh Coal Co., Philadelphia, and E. T. Stevens, Chas. A. Stevens & Bros., Chicago.

Moore Leaves Garford

LIMA, OHIO, Dec. 29—Paul Moore has resigned as president of Garford Truck Co. and will devote his attention to interests outside the industry. No successor has been named but present directors and organization will continue the policies and program followed in the past two years.

Bus-Truck Routes Exceed Rail Lines

WASHINGTON, Dec. 28—Motor buses and trucks in the United States are operating over regular routes far exceeding the total mileage of all the railroads in the country, it was revealed this week in a preliminary report by the U. S. Interstate Commerce Commission.

The report makes no mention of the possibility of Federal regulatory legislation, although the investigation was made with this in view by instruction from Congress. Recommendations of the commission, however, will follow.

The report lists 22,368 buses in operation as common carriers in line and terminal services, operating over routes aggregating 352,800 miles.

The final report of the commission is being held up pending receipt of all answers to its bus and truck questionnaires. The preliminary report is based on replies from 164 of the 176 Class 1 line-haul railroads, whose answers dealt with bus operations by railroads and their subsidiaries and by motor transport companies and individuals within their territories.

Morris Makes Offer for Wolseley Company

LONDON, Dec. 28 (*by cable*)—Morris Motors, Ltd., has made an offer to buy the assets of Wolseley Motor Co., the affairs of which company are now being concluded by order of the High Court following operation at a loss of over £1,000,000 in six years.

If terms of the offer are accepted by the court, Morris intends to carry the Wolseley company as an independent organization, concentrating after complete reorganization on the Wolseley six introduced at the Olympia show.

Falcon Names Service Head

DETROIT, Dec. 29—Falcon Motors Corp. has appointed R. C. Reicher service manager. Mr. Reicher comes to Falcon from the Chrysler Corp. where he has been assistant service manager. He has been connected with Chrysler and its predecessors for nine years.

Ford Over-Production Charge Not Warranted by Statistics

PHILADELPHIA, Dec. 30—Henry Ford's renewed denials that the Ford Motor Co. contemplates introduction of a six-cylinder car have been coupled this week with charges that the industry has over-produced, that 1926 has been an abnormal year and that 10 per cent of cars sold on time are being repossessed. These observations find Ford out of sympathy with the industry as a whole and they have been met with resentment in some quarters and amusement in others.

Two months ago there appeared some danger of over-production, but the figures show that the drastic curtailment of November and December has definitely removed the danger. Sales and production of cars and trucks for the year will run approximately 150,000 over 1925, which is a small enough increase, in the opinion of the industry, to show that the year has not been abnormal. Final compilations are expected to show that production gains by the industry as a whole have been made almost entirely at the expense of

the Ford Motor Co.

Ford's attack on instalment selling, it is pointed out, comes from one who was a tremendously important factor in the rise of automobile financing and whose organization for a period permitted its dealers to sell cars on as low down-payments as \$12.60 per car in several cities.

The only authoritative figures available, those of the National Association of Finance Companies up to Nov. 1, do not show that repossession have been even close to the 10 per cent reported by Ford. Repossessions on new cars sold on standard terms have been 2.09 per cent and on used cars on standard terms 4.27 per cent and at least 80 per cent, and probably more, of new and used cars financed have been handled on standard terms.

Only in the small proportion of new cars sold for less than 25 per cent of the time-selling price has the repossession ratio reached Ford's figure, and in these cases repossession have averaged 11.52 per cent.

Rediscount System to Assist Financing

Will Act for Finance Companies as Federal Reserve Acts for Banks

NEW YORK, Dec. 30—Formation of the American Rediscount Corp. for aiding established credit companies in the financing of new and used cars, as well as other instalment sales, with an authorized capital of \$31,500,000, is expected here to be of considerable help to automobile finance companies. The corporation is expected to work for finance companies as the Federal Reserve System does for banks. It will begin operations Jan. 5, having been chartered under the laws of Maryland.

At the head of the American Rediscount Corp. will be Lawrence H. Hendricks, now controller of the Federal Reserve Bank of New York. The corporation will operate through the Credit Corp. of America, organized recently under New York banking laws. There will be an advisory board of 25 bankers from various sections headed by Morgan J. O'Brien, a trustee of the Metropolitan Life Insurance Co. and head of the committee which made the survey on which the system is based.

Although most sound finance companies have been able to borrow from banks, the amount of false propaganda against instalment selling that has been spread in the last two years has brought up occasional difficulties, and these the new system with its rigid requirements on member companies is expected to overcome. The system will require 15 per cent cash reserve against outstanding loans of member companies and will rediscount only one-quarter of the borrowing limit thus established.

Among the provisions affecting motor car sales are maximum of 12 months to pay; down payments commensurate with immediate depreciation of the car; limitation of used-car financing in proportion to capital and to amount of paper purchased on new cars; used-car financing must not be in greater amount than one-third of the selling price of the new car and must not cover used-cars more than two and one-half years old or of cars no longer in production.

Biflex Promotes Adams

DETROIT, Dec. 27—The Biflex Products Co. of Waukegan, Ill., has promoted Floyd Adams, manager of its Detroit branch, to assistant general manager. Mr. Adams has also been in charge of manufacturers' sales. In assuming his new position he will continue to make his headquarters in Detroit, where he will also direct the branch.

Ford to Recondition Cars

DETROIT, Dec. 30—Ford Motor Co. will recondition any 1925 Ford car com-

pletely except tires for \$60 under terms of a special offer to dealers which is designed to permit of a higher offering for Fords taken in trade. The reconditioning would include new paint and upholstery and a completely rebuilt engine. The offer applies to any 1925 car regardless of condition and carries a three-month guarantee.

Report A.C.F. to Get Big New York Order

NEW YORK, Dec. 28—Members of the board of estimate of the New York City government are reported to have reached an agreement to award a franchise for bus operation in Manhattan, Brooklyn and Queens to the Equitable Coach Co. It is understood that the plan calls for 850 buses and that these are to be supplied by the American Car & Foundry Co.

The American Car & Foundry Co. has just delivered four standard, 29-passenger A.C.F. street car buses to the Service Transportation Corp., a subsidiary of the Third Avenue Railway Co., which is to operate buses in the Bronx.

New Stewart One-Ton Six to List Less Than \$1000

BUFFALO, Dec. 23—Stewart Motor Corp. will introduce a new one-ton six-cylinder model at the New York show. The new truck will carry the name "Buddy Stewart," and the chassis will sell under \$1000. The new model has a wheelbase of 128 in., 30 x 5 high pressure tires, steel spoke wheels, electric lights and electric starter, speedometer, underbody tire carrier, gasoline filter and an 8 ft. loading space.

The company will supply standard bodies with closed cab for a covered express type, open express and panel and stake.

Murray Corp. of America Succeeds Former Company

NEW YORK, Dec. 30—Announcement was made here today of the reorganization of Murray Body Corp. as the Murray Corp. of America under Delaware laws. The capitalization consists of 300,000 shares of no par common stock, the plans as announced previously fixing this one class of stock for the reorganized company.

B. & D. Financing Approved

NEW YORK, Dec. 29—Stockholders of Black & Decker Mfg. Co. ratified the proposal of the directors that the capital structure of the company be revamped. Under the plan 290,000 shares of stock will be authorized, of which 40,000 shares will be preferred, of a par value of \$25 a share and 250,000 shares of no par value, of which 100,000 shares will be issued in exchange for the 40,000 shares of common, of a par value of \$25 a share, now outstanding.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Dec. 30—The volume of holiday business appears to have been equal to or larger than that of last year in most sections of the country. In a number of districts, however, special conditions have restricted buying, such as low cotton prices in the South, unemployment in the automobile centers, recent bank failures in the Central West and reduced activity in the lumber business in the Pacific Northwest. Commodity prices in general declined last week, while the level of stock prices advanced. Money rates remained firm.

FREIGHT CAR LOADINGS

Car loadings during the week ended Dec. 11 numbered 998,715, as against 1,058,151 in the preceding week and 1,008,696 in the corresponding period last year. Loadings for the year to date total 51,586,479, which compares with 49,553,353 a year ago and 46,986,455 two years ago.

BANK DEBITS

Bank debits to individual accounts reported to the Federal Reserve Board for the week ended Dec. 22 were 3.3 per cent larger than the total for the preceding week and 7.4 per cent above that of a year earlier.

FISHER'S INDEX

The lowest level of wholesale commodity prices in two years was indicated by Fisher's index last week. The current figure is 146.5, which compares with 147.2 a week earlier and 149.4 four weeks earlier. The stock price index, on the other hand, advanced from 168.5 to 172.1.

FEDERAL RESERVE STATEMENT

Bills and securities held by the Federal Reserve banks declined \$7,200,000 during the week ended Dec. 22, gains of \$153,100,000 in discounts and \$3,500,000 in open market purchases being more than offset by a decline of \$163,800,000 in holdings of Government securities. Note circulation increased \$73,800,000, while deposits decreased \$84,500,000 and reserves \$41,800,000. The reserve ratio declined from 69.7 to 68.9 per cent.

During the same period, loans of reporting member banks increased \$61,000,000, with gains of \$103,000,000 in loans secured by stocks and bonds and \$1,000,000 in loans secured by Government obligations and a decline of \$43,000,000 in "all other" loans. Investments decreased \$39,000,000 and net demand deposits \$268,000,000, while borrowings from the Federal Reserve banks rose \$140,000,000. Loans to brokers and dealers, secured by stocks and bonds, made by reporting member banks in New York City increased \$31,000,000.

Automotive Buyers Clear Steel Stocks

Many Orders Reported Being Placed at Prices Below October Figure

NEW YORK, Dec. 30—While resumption of steel market activity following the Christmas holiday was a slow affair there is every indication that automotive consumers are not losing sight of their January, 1927, requirements. What relatively light tonnages of sheets are still due them on old contracts are being specified against so freely that they have ceased to be the market factor they were a month ago.

Quite some fresh sheet orders are being placed at prices \$2 per ton below the now strictly nominal, if not obsolete, quotations of early October. Some producers incline to the view that, although the October advance in sheet prices may have proved to be no more than a gesture, it did serve the important purpose of keeping prices from declining below the levels that had been in effect previous to the "advance." Present pressure on the market, however, is more the result of intensive competition among rollers than of resistance on the part of consumers.

Strip steel continues in fair demand from automotive consumers. The price situation has not changed. Cold-finishing of steel bars have a fair amount of business on their books for initial operations in the new year. Bolt and nut manufacturers characterize the outlook with reference to automotive demand and inquiries as cheering. Negotiations are pending for the placing of considerable automotive alloy steel business. All in all the steel market enters the new year with a rather light legacy in the way of unfilled orders, but also certain that any upturn in consumers' operations will bring out a broad demand quickly.

Pig Iron—Following several representative tonnage sales on an \$18.50 valley furnace basis, the market settled down to its former lethargic gait. Automotive foundries apparently await the turn of the year before placing fresh commitments.

Aluminum—Stocks of aluminum in bonded warehouses in the United States are relatively heavy and imports, especially from Norway, continue at an undiminished rate. The domestic producer is reported to be booking considerable 1927 business at unchanged prices. The market for remelted metal continues easy.

Copper—Consumers' stocks are said by producers to be so low that they must come into the market during the first fortnight of January. Waterbury fabricators of automotive brasses slowed down operations during the holiday period and their January copper requirements appear to be fairly well covered.

Tin—London is never in a very enterprising mood during the period that intervenes between Christmas and New Year's Day and the market is naturally dull. Although recent quotations have been

UPHOLDS 25% COST ON USED CAR SALES

WASHINGTON, Dec. 27—A decision by the Board of Tax Appeals, here, under which dealers handling used automobiles are entitled to list such cars at bona fide open market prices, less the selling cost, was handed down this week, in a suit by the Lord Motor Car Co., a California corporation, against the Commissioner of Internal Revenue, United States Treasury Department.

The Board of Tax Appeals, in its decision sustaining the value fixed by the company, stated: "The evidence adduced by the petitioner has convinced us that the cost of selling used cars is at least 25 per cent of their sale price." Judgment in the case will be entered after 20 days' notice, under Rule 50.

the lowest in three months, tin continues to sell at around 66 and 67 cents for spot metal, which is almost 15 per cent higher than last year's average.

Lead—Producers are about to open their books for February deliveries. A little business for January was done this week.

Zinc—The market's statistical position is good and, despite light demand, prices are fairly well maintained.

E. L. Vail and Associates Form Jaeger Company

NEW YORK, Dec. 27.—Jaeger Watch Co., Inc., has been formed in New York to introduce automobile watches made by the Jaeger Co. of Paris and Geneva, in the United States. The new organization will be headed by J. P. Hartnett, of Cartier, Inc., with Edgar L. Vail of Vail Watch Co. as vice-president, and A. E. Sieper, Cartier, Inc., secretary. Mr. Vail will be the active manager.

The new company will take over the activity of the Vail Watch Co., which will be discontinued. Orders are reported now on hand for equipment on two leading American cars with several other companies considering adopting these timepieces.

Harper A.S.S.T. President

CLEVELAND, Dec. 24—J. Fletcher Harper of Allis-Chalmers Mfg. Co. has been elected president of the American Society for Steel Treating, F. G. Hughes, New Departure Mfg. Co., has been elected vice-president, and W. H. Eiseman, secretary. New directors elected were L. D. Hawkrige, Hawkrige Bros. Co., and J. H. Nead, American Rolling Mill Co.

These new officers with R. M. Bird, past president; Zay Jeffries, Aluminum Co. of America, treasurer; Hyman Bornstein, Deere & Co., and R. G. Guthrie, directors, will constitute the official personnel for the coming year.

Holds Convenience Test of Truck Use

Adverse Effect on Rail Carriers Not Sufficient Reason for Regulation

NEW YORK, Dec. 24—The adverse effect on railroad business of motor truck and bus operation is not sufficient reason within itself for regulation of the latter, in the opinion of A. G. Patterson, head of the Alabama Public Service Commission and president of the National Association of Railroads and Public Utility Commissioners, whose recent address to the association in Asheville, N. C., is reported in a bulletin issued by the National Automobile Chamber of Commerce.

"The rights and interests of existing carriers by mail, or by boat, should, of course, not be ignored," said Mr. Patterson. "But we think the position is sound that if, with improved systems of highways, the motor bus and the motor truck can furnish to the people a more convenient, efficient and economical method of transportation, the people should not be denied the benefits thereof because the granting of franchises and certificates to such motor vehicle carriers to carry on business will necessarily result in some loss to the rail carriers or boat lines."

"If we say that motor vehicle transportation should be denied because the rail carrier in the territory can carry all the persons and goods offered and hence should not be injured by such competition when such motor transportation will be more convenient, more satisfactory and more economical, by the same token we should forbid the sale of electric lights because to permit it will injure the manufacturers of candles and oil lamps."

Federal Adds \$995 Model

DETROIT, Dec. 27—Federal Motor Truck Co. is adding a new one-ton model, which will be known as Federal FW, the chassis listing at \$995. The model will be offered with a large variety of bodies. The engine is a Waukesha with $3\frac{1}{2} \times 4\frac{1}{2}$ bore and stroke. Rated horsepower is 19.6 and developed horsepower 35. The piston displacement is 173 cu. in. Wheelbase is 124. Wheels are cast steel with 5 in. tires, having 20 in. base. Clutch is dry plate disk. The rear axle embodies spiral bevel gears with molybdenum axle shaft. A heavy unit type powerplant is used.

Gramm Gets Contract

LIMA, OHIO, Dec. 27—Gramm Motors, Inc., has been awarded the contract for chassis for the coaches to be operated by the Great Eastern Bus & Freight Lines from New York to St. Louis in conjunction with the Yelloway Lines from the Mississippi to the Pacific.

Meetings and Events Scheduled for Week of New York National Show

FRIDAY, JAN. 7

Studebaker Corp. of America,
Dealer Banquet, Hotel
Plaza 7.00 P. M.

MONDAY, JAN. 10

Automotive Electric Association,
Board of Governors' Meeting, Astor.
National Automobile Chamber of Commerce, Third World Motor Transport Congress, Roosevelt.
National Automobile Dealers Association, Convention, Commodore.
Rubber Association of America, Meeting, Commodore. 10.30 A. M.
Banquet, Commodore 7.00 P. M.
Society of Automotive Engineers, Metropolitan Section Meeting, Commodore. 6.30 P. M.
John N. Willys, Luncheon to News and Trade Paper Men, Biltmore 12.30 P. M.

TUESDAY, JAN. 11

American Automobile Association, Contest Board Meeting, Roosevelt 10.00 A. M.
Automotive Electric Association, Advertising Committee Meeting, Astor 10.00 A. M.
Automotive Electrical Banquet, Astor.
Geo. W. Davis Motor Car Co., Distributors' Dinner, Commodore 7.00 P. M.
National Automobile Chamber of Commerce: Third World Motor Transport Congress, Roosevelt. Service Meeting.
Banquet, Commodore 6.30 P. M.
National Automobile Dealers Association, Convention, Commodore.
Joint Service and Shop Equipment Meeting, with M. & A. M. A. and N. A. C. C. 10.00 A. M.
Oakland Motor Car Co., Luncheon, Commodore Noon
Packard Motor Car Co., All-Day Sessions for Distributors and Dealers, Biltmore.

WEDNESDAY, JAN. 12

American Automobile Association, Board of Directors' Sessions, Roosevelt Morning and Afternoon
Auburn Automobile Co., Luncheon, Commodore Noon
Cadillac Motor Car Co., Banquet, Biltmore 7.30 P. M.
Chevrolet Motor Co., Meeting, Mecca Temple Afternoon
Banquet, Commodore Evening
Chrysler Sales Corp., Dealers' and Distributors' Luncheon, Commodore 12.30 P. M.
Elcar Motor Co., Dealer Meeting and Lunch, Astor Noon
H. H. Franklin Mfg. Co., Luncheon and Meeting, Commodore 1.00 P. M.
Motor and Accessory Manufacturers Association, Directors' Meeting Morning
Meeting and Election of Officers, Astor 2.00 P. M.
Dinner, Astor 7.00 P. M.
Nash Motors Co., Luncheon, Pennsylvania Hotel 12.30 P. M.
National Association of Automobile Show & Association Managers, Meeting.
National Automobile Chamber of Commerce, Directors' Meeting, Headquarters 10.00 A. M.
Olds Motor Works, Meeting, Mecca Temple 2.00 P. M.
Eastern Dealers' Dinner, Commodore 7.30 P. M.
Packard Motor Car Co., All-Day Sessions for Distributors and Dealers, Biltmore.
Willys-Overland, Inc., Dealer Meeting, Roosevelt 10.00 A. M.
Luncheon, Roosevelt 12.30 P. M.

THURSDAY, JAN. 13

American Automobile Association, Board of Directors' Sessions, Roosevelt Morning
Overseas Automotive Club, Dinner and Meeting, Hotel Empire 6.30 P. M.
Paige-Detroit Motor Car Co., Luncheon, Commodore 12.30 P. M.
Peerless Motor Car Corp., Dinner, Commodore 6.30 P. M.
Society of Automotive Engineers, Dinner, Astor 6.30 P. M.
Velie Motors Corp., Luncheon, Commodore 1.00 P. M.

Servel Plans Expansion on Bodies for Chevrolet

EVANSVILLE, IND., Dec. 24—Through completion of plant building alterations all departments of the truck body building division of Servel Mfg. Co. will function hereafter according to the assembly line system with a greatly increased production schedule in prospect for 1927, H. T. Birdsall, secretary, announced this week. The company was formerly the Hercules Corp.

The entire automotive section will be grouped in one building. Departments will remain closed until early in January to allow for remodeling and inventory. The company closed the year with a schedule of 100 Ford and Chevrolet truck bodies a day. It is probable that the 1927 schedule will concentrate largely, or possibly wholly, on Chevrolet work, Mr. Birdsall said.

Velie Shows Sales Gain

MOLINE, Ill., Dec. 27.—A new sales record was hung up for November by the Velie Motors Corp. when the number of cars sold was 33 per cent greater than in November, 1925. The addition

of the new standard six line to the present Velie models is expected to result in the biggest year's business in Velie history during 1927.

Holbrook and Brewster Organize New Company

NEW YORK, Dec. 27—H. F. Holbrook-Henry Brewster Corp. has been formed by H. F. Holbrook, founder and former president of the Holbrook Co., and Henry Brewster, formerly of Brewster & Co., to take over the assets of the Blue Ribbon Body Corp., with plant at Bridgeport, Conn., for the building of custom motor car bodies.

As a further development, the company plans to expand the plant by additions of new buildings to build high grade or "luxurious" type bus bodies.

Cletrac Adds New Tractor

CLEVELAND, Dec. 27—Cleveland Tractor Co. will go into production on a new tractor shortly after Jan. 1 and announces that deliveries will be made in March. While details are withheld, it is known that the new machine will have a six-cylinder engine and a 75 draw-bar horsepower.

Ternstedt Expands and Adjusts Plant

Will Specialize Operations in Units on Completion of \$3,500,000 Program

DETROIT, Dec. 27—Ternstedt Mfg. Co. will complete early in 1927 a \$3,500,000 factory expansion program, which, with a complete readjustment of its manufacturing facilities, will permit of a largely increased production schedule. The expansion is integral with the expansion program of General Motors Corp. car divisions, for which it will supply increased quantities of body hardware, and is also designed to meet increased demand from car manufacturers generally.

Under the plant readjustment plan each unit will be designed and equipped for specialized production of specific items of mechanical hardware equipment or interior fittings.

Unit No. 1 will make heavy duty coach hardware, curtain rollers and special designs of window regulators and locks. No. 2 will make hinges, footrests and similar heavy construction parts; No. 3 will contain extensive rolling mill equipment for making special channel shapes and other parts from rolled sections and for finishing them in enamel and other surfacing; No. 4 will house the main press room, making small press parts; No. 5 will quarter the assembly operations on regulators and locks and will provide storage space for assembling car load shipments; No. 6 will be devoted exclusively to production of interior hardware, with the largest plating plant in the United States, equipped with laboratories, experimental rooms and other facilities needed to produce all modern plated finishes on a quantity basis.

The program includes new loading docks and installation throughout the plant of special material handling apparatus to reduce all manual handling to a minimum. The administration building is likewise being extended.

Murray-Ohio Shows Gain

CLEVELAND, Dec. 27—The Murray-Ohio Mfg. Co. has increased its facilities and is extending its business of making toy automobiles which President C. W. Hanson says now constitutes 35 per cent of the production. The Murray company improved its financial position this year by retiring \$50,000 of 8 per cent preferred stock, has no borrowed money and has increased its cash.

Triangle to Make Tubes

AKRON, Dec. 24—The Triangle Tire & Rubber Co. at Canton, will start the manufacture of automobile tire tubes shortly after the first of the year. Although Triangle has been making tires for several years, this is its first tube venture.

Men of the Industry and What They Are Doing

Cooper Fafnir Chairman, Stanley Named President

E. H. Cooper has resigned as president of Fafnir Bearing Co. and has been elected chairman of the board. He will be succeeded as president by Maurice Stanley, formerly vice-president and secretary. Mr. Cooper was one of the organizers of the company in 1911. He will continue actively interested in policies but will leave direction of the company to other officers.

The new president has been connected with the company since 1914 and has filled the offices of sales manager, secretary and later vice-president and secretary. He has been particularly identified with automotive sales and will continue his close associations with this branch of the business.

The change in officers has been accompanied by promotion of other executives, E. R. Carter and R. N. Hemmway, formerly assistant secretaries, being elected vice-presidents; A. G. Way, formerly treasurer, being elected secretary and treasurer, and C. F. Stanley, being elected assistant secretary.

R. R. Searles continues as vice-president and general superintendent, and G. F. Atwater continues as assistant treasurer.

G.M.T.C. Names Managers

F. W. Webster has been appointed manager of the Denver factory branch of General Motors Truck Co. and Joseph Davis has been named manager of the San Francisco branch. Mr. Webster was recently with Federal Motor Truck Co. and Mr. Davis was formerly a member of the Reo Motor Car Co. organization.

Hinkley Sells Interest

C. C. Hinkley, president of the Hinkley Motors & Parts Corp. has announced that he has sold his entire interest in the company to B. A. Small of Philadelphia. Mr. Hinkley has had a long and varied experience in engine manufacturing and designing and is well known in automotive circles. His future plans are not yet announced.

Cruger Resigns Position

Henry D. Cruger has resigned as auditor of the Fifth Avenue Coach Co., effective Dec. 31, serving thereafter in a consulting capacity. He will be succeeded as auditor by G. V. Owen. W. G. Strait has been appointed purchasing agent of the company, and C. A. Wittcke, assistant purchasing agent as of Jan. 1.

Dominge District Head

Harry Dominge has been appointed district manager for Oklahoma, and H. W. Neebe, district manager for Illinois, by the Lincoln Products Co.

SWAYNE ON BOARD TO STUDY FARM AID

Alfred H. Swayne, vice-president of General Motors Corp., has been named a member of the Business Men's Commission on Agriculture, created by the National Industrial Conference Board and the Chamber of Commerce of the United States. The purpose of the commission is to make an exhaustive study of the agricultural problem in itself and in its relation to general economic activities. On the basis of its recommendations it is hoped to give aid in arriving at a national agricultural policy.

A.E.A. Appoints Ashton

E. J. Ashton has been appointed one of the special merchandising representatives of the Automotive Equipment Association. Since the inception of the industry Mr. Ashton has been engaged in merchandising work as a jobber salesman and as head of a jobbing organization which still bears his name though he has disposed of his interest. For the last two years Mr. Ashton has represented the Biflex Corp. With the A.E.A. he will devote his attention to merchandising activities in Missouri, Kansas, Iowa, Nebraska, Minnesota and North and South Dakota.

James Bunting Manager

A. P. James is the new executive in charge of the Pacific division offices of the Bunting Brass & Bronze Co. Mr. James has been sales manager of the automotive replacement department in the main sales offices at Toledo. Mr. James advanced to executive positions from factory departments and is thoroughly experienced in all the processes of manufacture. A branch sales office and a large stock of Bunting products in San Francisco will be under his management.

Grubb to Form Company

D. A. Grubb, for many years an executive in the tire industry, expects to launch a rubber company in Akron for the manufacture of tires and tubes. Mr. Grubb recently resigned as vice-president and general manager of the Star Rubber Co. He was one of the organizers and original officers of the India Tire & Rubber Co.

North East Promotes Trube

R. L. Trube has been appointed sales representative in the Detroit district of North East Electric Co., returning from England where he was London manager for North East. Previous to joining North East he was with Automobiles Renault.

Hupp Fixes Territory of Field Organization

The field organization of Hupp Motor Car Corp. now includes nine representatives in the United States and Canada. The men and their territories are L. F. Barrett, New England and North Atlantic seaboard; J. S. Daley, New York and eastern Pennsylvania; I. M. Kauffelt, Ohio, Indiana, Michigan, West Virginia and Kentucky; G. H. Wright, Illinois, Wisconsin, Missouri, Kansas and Oklahoma.

M. D. Heron, Virginia, North and South Carolina, Georgia and Florida; G. A. Clark, Texas and Arizona; F. D. Peabody, Colorado, Wyoming, Montana, Idaho, Iowa, Minnesota, Nebraska, North and South Dakota and Utah; H. R. Roberts, the Pacific Coast, Nevada and Vancouver, and D. L. LaFontaine, Canada.

Hall Gets New Post

C. M. Hall, manager of the Cleveland office for Black & Decker Mfg. Co., has been promoted to assistant general sales manager with headquarters in Baltimore. He will be succeeded by Ray F. Mitten, formerly Black & Decker representative at Columbus. Mr. Hall has done much to promote merchandising ideas among jobbers. Mr. Mitten has been an aggressive and intensive merchandiser.

The Cleveland Automotive Boosters Club gave Mr. Hall a farewell party at the Winton Hotel. Mr. Hall is the retiring president of the Cleveland Boosters and was also its first president. He is now a director.

Head Buhl-Verville Staff

The personnel of the Buhl-Verville Aircraft Co., which has now moved to Marysville, Mich., is E. Dormoy, chief engineer; L. Hughes, general manager, and L. G. Meister, sales manager.

G. M. Gunderson Improved

George M. Gunderson, purchasing agent of the Cooper Corp., is recuperating following a major operation and will be away from his desk probably until Feb. 1.

Oakland Names Managers

W. M. Warren has been appointed Seattle district manager for the Oakland Motor Car Co., succeeding T. B. McManus, resigned, and D. M. House has been named Denver district manager, succeeding A. M. Potter, resigned.

Chinese Imports Grow

WASHINGTON, Dec. 30—Chinese imports of automobiles during the first six months of the current year amounted to 2609 units, as compared with 1307 during the corresponding period last year, according to figures compiled by the Department of Commerce.

Exports, Imports and Reimports of the Automotive Industry for November of Current Year and Total for Eleven Months Ending November, 1926

	EXPORTS							
	Month of November		Eleven Months Ending November		1925		1926	
	Number	Value	Number	Value	Number	Value	Number	Value
Automobiles, parts and accessories (total)...		\$26,633,736		\$26,621,543		\$286,651,206		\$294,887,119
Electric trucks and passenger cars.....	4	7,675	2	1,300	114	175,603	93	130,362
Motor trucks and buses, except electric:								
Up to 1 ton, inclusive and valued up to \$800, inclusive.....	6,019	2,458,720	5,639	2,255,887	36,304	13,529,545	47,126	20,128,786
Value over \$800.....	198	228,289	197	232,311	2,778	2,962,731	2,401	2,768,811
Over 1 and up to 2½ tons.....	945	1,206,098	1,259	1,402,533	9,171	11,324,752	11,310	14,495,476
Over 2½ tons.....	153	436,812	216	642,103	1,471	4,495,617	2,089	6,433,468
Total motor trucks and buses, except electric	7,315	4,329,919	7,311	4,532,834	49,724	32,312,645	62,926	43,826,541
PASSENGER CARS								
Passenger cars, except electric:								
Value up to \$500, inclusive.....	9,141	3,668,495	9,788	3,991,125	88,358	32,683,431	89,347	34,591,056
Value over \$500 up to \$800.....	4,739	3,457,697	4,739	3,342,623	55,558	39,573,985	60,443	41,480,592
Value over \$800 up to \$1200.....	5,811	6,163,097	4,617	4,890,455	53,745	56,407,751	51,188	54,059,130
Value over \$1200 up to \$2000.....	1,045	1,600,174	901	1,393,908	17,295	25,860,214	10,505	16,141,883
Value over \$2000.....	428	1,152,716	517	1,406,243	4,731	12,918,003	5,190	14,107,387
Total passenger cars, except electric	21,164	16,042,179	20,562	15,023,354	219,687	167,443,384	216,673	160,380,048
PARTS, ETC.								
Parts, except engines and tires:								
Automobile unit assemblies.....		2,717,208		2,814,719		38,632,472		36,905,582
Automobile parts for replacement.....		2,334,033		3,140,559		25,933,419		32,844,273
Automobile accessories.....	679,674		633,179			7,857,811		8,618,733
Automobile service appliances (n. e. s.).....	615,727		427,202			5,025,709		6,382,174
Station and warehouse motor trucks.....	8	9,217	11	16,480	234	177,452	159	171,691
Trailers.....	72	32,028	126	37,411	530	258,151	954	333,273
Airplanes.....	6	98,600	1	5,083	77	457,953	36	166,509
Parts of airplanes, except engines and tires		1,381		5,063		99,749		133,085
BICYCLES								
Bicycles and tricycles.....	654	15,461	321	8,448	6,921	182,965	4,834	138,443
Motor cycles.....	2,011	432,309	1,447	322,884	20,460	4,570,809	20,818	4,520,137
Parts, except tires.....		116,771		144,473		1,500,597		1,611,172
INTERNAL COMBUSTION ENGINES								
Stationary and portable:								
Diesel and Semi-Diesel.....	94	192,449	28	127,121	1,174	782,323	738	1,479,316
Other stationary and portable:								
Not over 10 HP.....	2,442	191,994	2,850	245,923	26,249	2,247,548	31,009	2,961,563
Over 10 HP.....	143	302,944	249	313,823	2,377	2,185,813	2,700	2,442,807
Automobile engines for:								
Motor trucks and buses.....	108	23,899	188	42,165	39,007	3,334,782	3,652	543,434
Passenger cars.....	3,891	499,149	2,305	433,433	96,361	10,961,090	112,105	11,638,146
Tractors.....	54	23,783	246	83,946	1,396	578,951	2,113	1,115,078
Aircraft.....	2	2,358	2	1,087	59	147,442	296	569,232
Accessories and parts.....		305,138		358,135		3,757,758		3,957,757
Automobiles and chassis (dutiable).....	111	131,469	90	109,223	640	1,000,348	738	1,220,754
Other vehicles and parts for them (dutiable)		82,885		13,514		763,834		145,603
Automobiles (free from duty).....	22	22,453	29	36,912	194	272,357	181	267,201

Chance Vought Develops New High Speed Plane

NEW YORK, Dec. 29—Chance Vought Corp. has produced in cooperation with the Bureau of Aeronautics a new two-seater naval observation and high-speed scouting plane called the Corsair. In official flight tests it has indicated performance and maneuverability characteristic of service single-seater planes especially at high altitudes. It has also indicated ability to carry larger loads at greater speed range.

The company in closing another successful year will pay employees a bonus of 3 per cent based upon the total amount of wages received for the year. A large number of the employees have been with the company continuously since the war.

Swiss Tare Basis Lower

WASHINGTON, Dec. 29.—Changes in tare percentages effective in computation of import duties in Switzerland went into effect Oct. 1, the United States Chamber of Commerce announced here this week. The changes include reductions on automobiles, assembled or unassembled, of from 10 per cent to 5 per cent.

Open N.Y.-Atlanta Air Bids

WASHINGTON, Dec. 27—Bids for the proposed New York-Atlanta airmail line will be opened on Feb. 23, it was

announced today by Postmaster General New. The route will be from New York to Atlanta by way of Philadelphia, Washington, Richmond and Greensboro, N. C. All flying will be done at night.

Army Plans Building Own Fire Fighting Apparatus

WASHINGTON, Dec. 27.—The War Department announced this week that it will not purchase new fire engines in the open market to replace 300 pieces of motor-driven apparatus now becoming unserviceable, after at least seven years of use, but will assemble its own apparatus from Army "B" truck chassis and spare parts available in the department. It estimates that there will be a saving of \$8000 on each unit, or \$2,400,000 on the lot.

There have been no purchases of new motor-driven fire apparatus for Army use since 1919 and the greater part of those now in service were purchased during the years 1917 and 1918.

Would Bar Imported Parts

WASHINGTON, Dec. 26—Importation free of duty of foreign-made parts for use on American made automobiles would be prohibited under a bill introduced in the House by Representative Bacon of New York. The Philippine Islands, Virgin Islands, and the islands of Guam and Tutuila are exempted from the bill.

1925 Car Fatality Rate One Every 923 Vehicles

WASHINGTON, Dec. 29—There was one automobile fatality to every 923 cars registered in the United States, according to a report submitted to Secretary of Commerce Hoover this week by the National Conference on Street and Highway Safety, for the calendar year 1925.

More than 21,620 persons died in accidents in which automobiles alone figured. Including accidents in which automobiles were involved, but which were charged directly against railroads and electric car lines, 26,627 persons were killed. The motor registration total for the year was given as 19,954,347.

Preliminary estimates for 1926 show that the death rate has been even higher during the 12 months now coming to a close.

Exports Tire Equipment

AKRON, Dec. 24—The Akron Standard Mold Co. reports shipment of automatic self-rimming vulcanizers and other equipment to the Tan Kah Kee Tire & Rubber Co., Singapore, Malay Peninsula. Large shipments of equipment also have been made to Sydney, Australia.

New Chrysler 80 Coupe

DETROIT, Dec. 27—Chrysler Corp. has added a five-passenger coupe on the Imperial 80 chassis, listing at \$3095.

Federal Aid Meets Congress Approval

Appropriation of \$77,500,000 for 1928 Operations Draws No Discussion

WASHINGTON, Dec. 27—The 1928 Agricultural Departmental bill, containing \$71,000,000 for Federal aid of highways, and \$6,500,000 for highway construction in Federal forests, was passed this week by the House. Passage of the measure, containing total appropriations of \$128,376,000 was without discussion in so far as the Federal aid for highways was concerned.

With the 1928 highway appropriation, the total amount thus far provided from the Federal treasury for highways amounts to \$668,700,000.

In addition to the Federal aid amount provided, a sum of \$100,000,000 to be expended in 1928 and 1929, is provided under the terms of a bill (H. R. 15422), introduced in the House this week by Representative Reece of Tennessee, in the improvement of rural post roads in the Federal aid system.

The Reece measure was referred to the committee on roads for hearings and the agricultural appropriation bill was sent to the Senate for passage.

U.S. Highway System Covers 80,000 Miles

WASHINGTON, Dec. 24—Final location of the 80,000 miles of the nation's most important roads, which will constitute the United States System of Highways was announced this week by the United States Bureau of Public Roads in Washington. Public announcement of the routes is being held up until maps can be completed. The system was given final approval by the American Association of State Highway Officials at its annual meeting just held at Pinehurst, N. C.

Ten main transcontinental routes are included in the system. They will be designated by numbers which are multiples of ten. North and south routes will be numbered 1, 11, 21, 31, etc. Standard danger, caution and directional signs will be adopted. United States highways have been completely marked in 22 states, partially marked in 14 and in six the work will be completed next season.

Michigan Sales Show Drop

DETROIT, Dec. 27—New car sales in Michigan registered a sharp decline in November. Sales for the month for all makes aggregated 6835 units compared with 11,328 cars for the same month a year ago. Sales during the first 11 months total 186,747 compared with 180,153 in 1925. Truck sales for the same period in 1926 aggregate 19,625.

GOOD DRIVERS GET CONDUCT EMBLEMS

SEATTLE, Dec. 27.—The International Association of Automobile Traffic Officers will award a good conduct emblem to every car owner who was not arrested during 1926 for speeding, reckless or drunken driving, and who did not figure in any serious accident.

The purpose of the award is to create a spirit of cooperation and understanding between the motorist, the pedestrian, the traffic officer and the judge, the association says. Parking violations, often caused by misunderstanding, will not be considered in making the awards.

Membership of the association is composed of police and traffic officials who are cooperating in solving motor vehicle traffic problems.

Five Months' Taxes Decrease \$19,945,481

WASHINGTON, Dec. 28—Manufacturers' excise taxes on automobiles, trucks, motorcycles, tires and accessories all reflect the effects of the Revenue Act of 1926 through repeal or heavy reductions, in the statistics of collections for the five months ending Nov. 30, issued this week by the U. S. Bureau of Internal Revenue.

Taxes on automobiles and motorcycles for the five months, July 1 to Nov. 30, totaled \$32,089,240, a reduction of \$19,945,481 below those collected for the same period in 1925. The taxes for November, 1926, were \$5,157,435, as compared with \$12,614,150 for November, 1925.

Tax repeals provided in the 1926 act resulted in tax savings over the five months' period of \$3,698,908 on automobile trucks and wagons and of \$10,881,524 on tires, parts, accessories.

Nash Adds Sedan at \$1085

KENOSHA, Dec. 27—A de luxe model four-door sedan, priced at \$1085, has been added on the light-six chassis by the Nash Motors Co. It is finished in two shades of blue lacquer. The fenders and upper portion of the body are deep blue and the lower portion and running gear in a lighter shade. The equipment of the car includes double-beam bullet type head lamps and bullet type cowl lamps, and front and rear bumpers. The car is upholstered in mohair.

Gives \$650,000 to Employees

KENOSHA, Dec. 27—A Christmas distribution of more than \$650,000 in cash was made by Nash Motors Co. among approximately 14,000 employees. The distribution marked the close of the company's biggest business year.

British Hold Hopes for Export Increase

Will Get Better of Competition by Improving Efforts Says Morris

LONDON, Dec. 16 (*by mail*)—W. R. Morris, moving spirit of Morris Motors, Ltd., reports excellent prospects for 1927. He said his company was getting such large export orders they were almost overwhelmed. Moreover, the volume of the home demand was extraordinary, especially considering the recent industrial troubles.

With regard to British prospects overseas, Mr. Morris said: "If the British motor industry will only give a little more attention to the needs of the countries overseas I am convinced that they will be able to do good business and get the better of their competitors. In my recent conversations with the overseas premiers I have received every encouragement and help in the work of stimulating British business in the various parts of the Empire. In fact, in my opinion, the visit of the overseas premiers has done more to stimulate British automobile trade overseas than anything else that has happened in the past decade."

Two British Makers Report 1926 Losses

LONDON, Dec. 16 (*by mail*)—Two of the oldest British automobile companies have issued reports during the past day or two showing losses on the year ended July 31 and Aug. 31 respectively. These are the Swift Motor Co., which shows a debit balance of nearly £71,500 and the Rover Co., which has lost nearly £123,500 during the year.

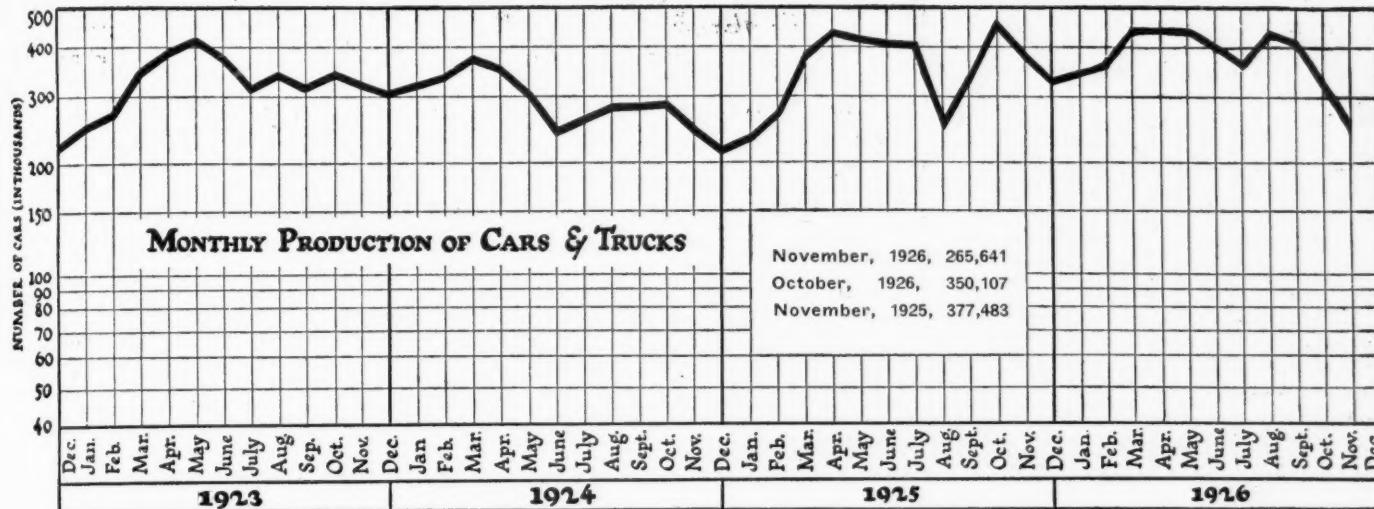
The report of the Standard Motor Co. discloses reduced profits; £47,000 in place of £108,000 for the preceding year and, although, a 10 per cent dividend is being paid (instead of 15 per cent), the wisdom of this distribution is questioned.

All three companies partly ascribe their unsatisfactory reports to the coal strike, though the Swift directors say that a breakdown of production in the early part of the year resulted in large numbers of orders being unfilled. This company entered into an arrangement with its creditors in August whereby the latter receive third debenture stock to the value of the sums owing to them; in addition, a reduction of capital is mooted in the near future.

The Rover report indicates that a new "intermediate priced" model is on the stocks, but no details are available for publication. At present the Rover range consists of a 9 hp. light car (two and four-passenger) selling at £200-£220, a 14 hp. with prices ranging from £475 to £685 and a 16 hp. at £565 to £775.

NUMBER OF CARS (IN THOUSANDS)

November Production Shows Sharp Drop



Air Mail Awards to Boom Air Lines

WASHINGTON, Dec. 27—In an oral announcement at the Department of Commerce, Secretary Herbert Hoover declared that the most important step yet made by the government in behalf of commercial aviation will be the award, to private firms, of contracts for transcontinental air mail, bids for which will be opened Jan. 15.

Mr. Hoover declared that these contracts will mean between 8000 and 9000 miles of private air lines in operation and he estimated that, by July 1 next, this will have grown to more than 10,000 miles. The United States, he said, is on the verge of developing the first successful and profitable air service in the world, all the European air lines now being operated under governmental subsidies.

Velie Adds \$1045 Coupe and Revises Price List

MOLINE, ILL., Dec. 27—Velie Motors Corp. has added a three-passenger coupe, listing at \$1045, to its Standard Six line. Additional equipment, including front and rear bumpers, stop light, extra tire, tube and cover and radiator emblem, is offered at \$57. Upholstery is in dark blue, pebble grain leather with door panels and headlining to match. Exterior finish is gray with a second shade used for the belt.

Prices on other models are Standard Six sedan \$1045; Model 60—club phaeton \$1450, four-passenger coupe \$1585, five-passenger royal sedan \$1585, five-passenger special sedan \$1585.

Build New Arc Welder

DES MOINES, Dec. 27—An improved air-cooled alternating current arc welding machine invented by Ralph and Earl Brummet has been placed on the market by the Monarch Electric Welder

Co. It is designed to make welds of both steel and cast iron parts in both light and heavy duty work. The welder is adapted for operation on 110 and 220 volt power circuits and its amperage can be adjusted between the limits of 20 and 170. Economical operation is one of the advantages claimed for the welder, which is said to have been designed primarily for mass production purposes but to be adaptable also to the requirements of garages and service stations.

Italian Companies Join to Promote India Sales

PHILADELPHIA, Dec. 27—According to an item in Popolo di Roma, three Italian automobile manufacturing concerns have organized a joint exporting company to operate in British India as the Italian Motorcar Co. Offices will be maintained in Genoa and Bombay, and it is hoped to enter into successful competition with British and American makes. The three firms concerned are Isotta-Fraschini, Ceirano and F. O. D. (Fonderie-Officine di Benedetti Torino). Isotta furnishes luxury type passenger cars, which is expected to compete with Rolls-Royce; Ceirano, a lighter, cheaper design, and F. O. D., a popular priced car designed to enter into competition with Ford. It is planned to open sales-rooms and service stations in Bombay, Calcutta, Madras and Karachi. It appears that efforts are being made to get Fiat to join the organization and thus form a sort of trust for the exportation of Italian cars to India.

New Schrader Plant Ready

AKRON, Dec. 27—Construction of a five-story reinforced factory building has just been completed here by A. Schrader's Son, Inc. The new building, which adjoins the present company warehouse, follows the completion of two seven-story reinforced concrete buildings added last year to the main Schrader plant in Brooklyn, N. Y.

Financial Notes

Federal Motor Truck Co. for the nine months ended Sept. 30, shows net income of \$1,319,477 after depreciation, interest and Federal taxes, equal to \$1.29 a share earned on 400,000 no-par shares of stock. Income amount for nine months ended Sept. 30 was: Gross \$10,972,537; expenses, etc., \$8,626,345, operating income \$1,446,192, other income \$190,322, total income \$1,636,514, depreciation \$62,739, interest \$66,298, Federal taxes \$188,000, net income \$1,319,477. Net profit for the full year 1925 was \$1,234,799 before Federal taxes.

Packard Motor Car Co. reports for quarter ended Nov. 30, 1926, net profit of \$3,835,475, after depreciation, Federal taxes, etc., equivalent to \$1.27 a share (par \$10) earned on 3,004,264 shares of stock, comparing with \$4,789,509, or \$1.83 a share, on 2,614,722 shares outstanding in corresponding quarter of 1925.

Pyrene Mfg. Co. declared a stock dividend of 50 per cent, increasing its outstanding stock from 1,500,000 to 2,250,000 shares of \$10 per value, payable Jan. 15 to stockholders of record Dec. 31. A quarterly cash dividend of 2 per cent was also declared, payable Feb. 1. The previous annual rate was \$1 or 10 per cent.

Eaton Axle & Spring Co. declared the regular quarterly dividend of 50 cents a share payable Feb. 1 to stock of record Jan. 15. It was recently forecast by Eaton executives that the company would earn \$4 in 1926, twice the rate of the present annual dividend disbursement.

Ajax Rubber Co. is offering an additional 200,000 shares of stock at \$10 per share. Stockholders as of Jan. 5 will have the right to subscribe. There are now outstanding 500,000 shares of no par stock. The capital stock is 1,000,000 shares.

C. G. Spring & Bumper Co. declared regular quarterly dividend of 10 cents and an extra of five cents on the no par shares, payable Feb. 15 to stockholders of record Feb. 8.

Superheater Co. declared an extra dividend of \$5 and the regular quarterly dividend of \$1.50.

Delegates to Speak at World Congress

NEW YORK, Dec. 28—Representatives of motor organizations in many countries will address the Third World Motor Transport Congress which will be held at Hotel Roosevelt here, Jan. 10 and 11, under the auspices of the National Automobile Chamber of Commerce. The speakers' list to date includes:

Col. J. Sealy Clarke, former president, Society of Motor Manufacturers and Traders of Great Britain; Dr. Allmers Geheimrat, president of Automobile Manufacturers Association of Germany; A. W. Campbell, chief highway commissioner of Canada; Kommerzialrat C. R. Perl, vice-president of Automobile Manufacturers Association of Austria; J. Chilton, representative of Motor Agents Association of Great Britain and Councillor of British Institute of the Motor Trade; George N. Penso, member of Imperial Association of Jamaica; J. G. Shirley, representative of Automotive Association of Mexico; Dr. E. Tilgenkamp, representative of Swiss Touring Club; J. T. Romanas, secretary of Lithuanian Automobile Club, and Ernesto V. Duperly of Bogota, Columbia.

Danger Hour 4 to 5 P. M.

NEW YORK, Dec. 28—The chief danger hour in driving an automobile is from 5 to 6 p. m., according to information received by the National Automobile Chamber of Commerce based on a compilation of more than 1000 motor fatalities. In all instances the factor of fatigue was found to be strong. The most dangerous morning hour was from 10 to 11. This was believed to be due to carelessness, based on the assumption that the morning rush was over.

Ford Tries Flax Raising

ATLANTA, Dec. 28—Henry Ford is making an experiment in the raising of flax in Georgia, according to the commissioner of commerce and labor of this state, who recently made an inspection tour of Ford holdings.

Coming Feature Issues of Chilton Class Journal Publications

- Jan. 1—Automobile Trade Journal—Annual Show Issue.
- Jan. 6—Motor Age—Annual Show Issue.
- Jan. 20—Commercial Car Journal—New York Show Issue.
- Jan. 27—Motor Age—Chicago Show Issue.
- Feb. 19—Automotive Industries—9th Annual Statistical Issue.

Oakland Contest Spurs Retail Sales Interest

DETROIT, Dec. 27—The National Football Contest recently completed by the Oakland Motor Car Co., drew keen interest from Oakland-Pontiac salesmen all over the country. It was originally planned to offer prizes totaling \$10,000 but the contest proved so successful, this total was augmented by additional awards. A feature of the contest was that used cars were credited as liberally as new car sales.

Dealers were placed into four classifications, depending on the number of cars the yearly contract stipulates and salesmen of the retail organizations or "football teams" were entered under these classifications.

Develops Reduction Gear

CLINTON, IOWA, Dec. 17—A reduction gear giving a ratio of $3\frac{1}{2}$ to 1, for use with its R4U, TU and R6U engines, has been developed by the Climax Engineering Co. The normal speeds of these engines range between 950 and 1000 r.p.m. but many industrial units driven by them are designed for much lower speeds and hence a reduction gear is required. The reduction gear consists of two parallel shafts connected by machine-cut, heat-treated gears and running in the same direction, the gearing, together with the twin disk clutch provided, being inclosed in a housing which bolts to the flywheel housing.

Rubber Certificates Cover 40,000 Tons

NEW YORK, Dec. 27—The British Colonial Office has announced figures on the unused export rights and uncoupled rubber, and the rubber held against these rights. According to word received here, outstanding unused rights for Ceylon total 15,000 tons, with 7000 tons held against these rights. Outstanding unused rights in five Malaya districts amount to 24,839 tons, of which rubber dealers hold 6315 tons, excluding stock in Singapore and Penang.

Producers' stocks of rubber in Malaya total 28,665 tons. Unused export rights in Federated Malay States of producers holding over 100 acres total 6507 tons, of which 4129 tons are held with rubber. Total stock of rubber held by these producers without export rights was 12,456 tons.

Tyree to Increase Capital

BLOOMINGTON, ILL., Dec. 27—to provide for expansion in the activities of the Tyree Auto Radiator Mfg. Co., stockholders have authorized increase of its capitalization from \$200,000 to \$750,000. The new capitalization, President Tyree announced, will not be acquired through sale of stock but will place the company in position to expand without succeeding action of this kind. Sales, which in the past have been largely confined to retail dealers, are now reaching the manufacturers and prospects during the year are for large wholesale purchases. Operations in the local plant have been so satisfactory that there is also prospect of transferring the Chicago assembly plant to this city.

Olds Set for Big Drive

LANSING, Dec. 30—The greatest production program in the history of the Olds Motor Works will be inaugurated when the factory opens Monday morning. The increased schedule follows two succeeding years in which Oldsmobile broke all former records. To provide facilities for the increased schedule the company has installed much additional machinery.

Calendar of Coming Events

SHOWS

- Cairo Feb. 15-March 15
- First International Motor Show.
- Chicago Jan. 10-15
- Coliseum, American Road Builders' Association.
- Chicago Jan. 29-Feb. 5
- National, Coliseum, National Automobile Chamber of Commerce, including special Shop Equipment Exhibit.
- Chicago Jan. 29-Feb. 5
- Annual Salon, Hotel Drake.
- Colombo Jan. 6-16
- All-Ceylon Motor and General Engineering Exhibition.
- Copenhagen February
- Danish Automobile Exposition.
- Geneva March 4-13
- Palais des Expositions.

- Los Angeles Feb. 12-19
- Annual Salon, Hotel Biltmore.
- New York Jan. 8-15
- National, Grand Central Palace,
- National Automobile Chamber of Commerce, including special Shop Equipment Exhibit.

CONVENTIONS

- American Road Builders' Association, Congress Hotel, Chicago Jan. 10-15
- Automotive Electric Association, Electrical Service Meeting, Congress Hotel, Chicago Feb. 1-2
- National Association of Automobile Show and Association Managers, Drake Hotel, Chicago Feb. 3
- National Automobile Dealers Association, La Salle Hotel, Chicago, Feb. 1-3
- National Foreign Trade Council, Detroit May 25-27

- National Safety Council, Mid-West Safety Congress, Hotel La Salle, Chicago Feb. 21

N. A. C. C.

- Chicago, Feb. 1—Service Meeting.

S. A. E.

- Detroit, Jan. 25-28—Annual Meeting.

- Detroit, Jan. 28—Carnival.

RACES

- Altoona, Pa. June 11
- Atlantic City April 30
- Charlotte, N. C. May 9
- Fresno, Cal. April 21
- Indianapolis May 30
- Los Angeles Feb. 22
- Los Angeles April 10
- Salem, N. H. June 26
- For New York Show week events see special calendar.



American Walnut Steering
Wheels—America's Finest
Cabinet Wood.

BEAUTY, strength and refinement of design combine to give Steering Wheels by Allerding that added touch of artistry so noticeable at the shows.

THE ALLERDING PRODUCTS COMPANY, MANSFIELD, OHIO

Manufacturers of steering wheels, steering wheel rims, steering wheel spiders

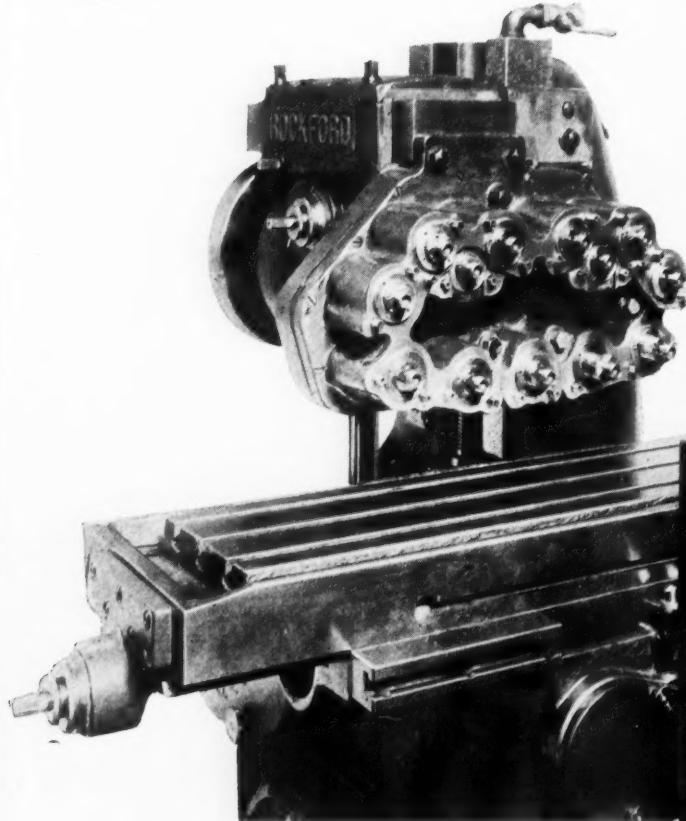
ALLERDING
Steering Wheels





CHRYSLER SELECTS BECAUSE

RIGIDMIL
TIMKEN-EQUIPPED



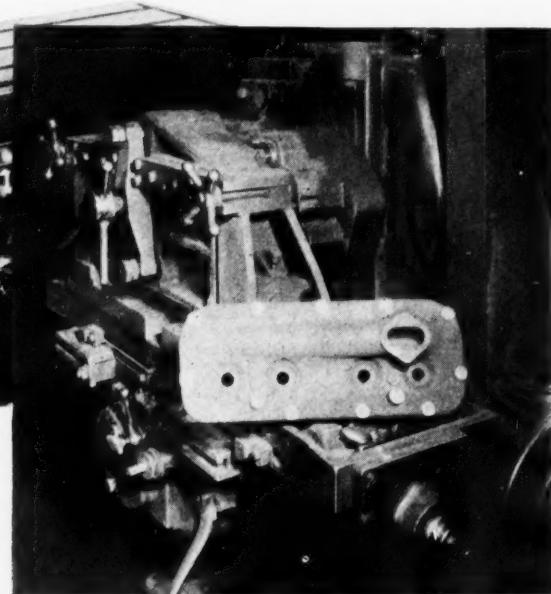
This is a good illustration of the versatility of the Rigidmil. This head has thirteen spindles, each maintained in individual quills on anti-friction bearings and provided with an endwise adjustment of $\frac{3}{4}$ ". It is designed to mill simultaneously all of the bolt pads on the Chrysler cylinder head.

It works in connection with a fixture that is loaded in a horizontal position and indexed to the cutting position by swinging 90°. This method eliminates the necessity of a cross adjustment otherwise required to avoid the interfering pad on top of the cylinder head.

of the many unusual features that make Rigidmil so well suited to the automotive plant where changes in design require machine tools of flexibility.

Aside from the inherent power and rigidity obtained by virtue of the column, knee and saddle cast integral, solid splined shafts, Timken bearings and the elimination of trains of feed and speed gears, the Rigidmil lends itself exceptionally well to the application of special attachments and fixtures.

Chrysler realizes these advantages and Rigidmils are purchased on repeat orders for various departments.



After the work is indexed to position, which is with the bosses to the side of the milling cutter, the feed is engaged and all milled simultaneously. The rapid traverse is engaged, the cutters returned to the starting position, and all thirteen bosses are finished in the one setting.

We will be glad to tell you how the Rigidmil will fit in with your production line-up

Sundstrand Machine Tool Co.

Simplified-Accurate High Production Machine Tools

ROCKFORD & ILLINOIS, U.S.A.

THE BUILDING OF A HARRISON RADIATOR

Testing Cores

Every Harrison Radiator is carefully tested for leaks. The core is filled with air and submerged in a tank of water. Air bubbles definitely mark the presence of the slightest leak. Once located, they are immediately soldered and made air-tight.

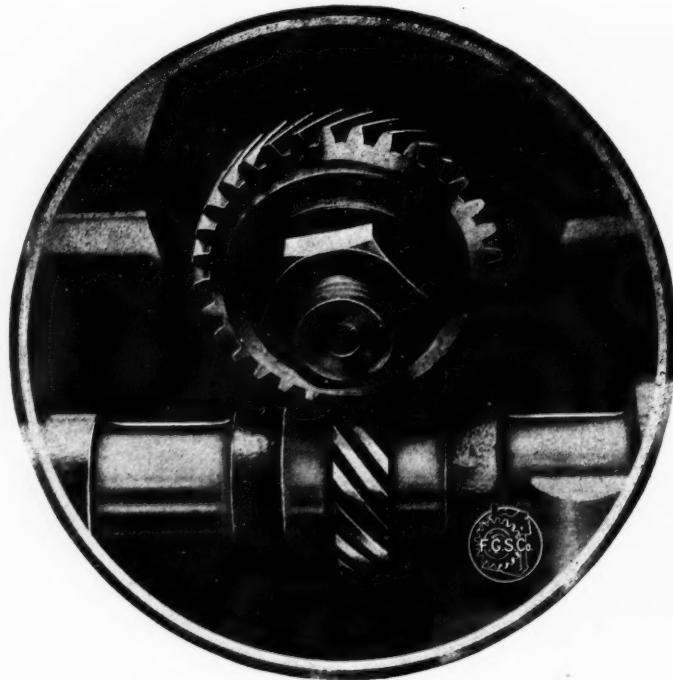
But this test alone is not considered sufficient by Harrison. The core is again immersed and inspected to preclude further any possibility of leakage.

Thus precautions are taken at the various stages in Harrison production to insure uniform quality and dependability.

**HARRISON
RADIATORS**

Under-water test for leaks.





Generating a straight-sided involute worm for a cam-shaft on the New Model Thread Generator.

Worms on Camshafts

The new model Thread Generator can be adapted with excellent results to the generating of involute straight-sided worms on camshafts for distributor drives, etc.

For this operation, the camshaft is supported between centers, and additionally supported by a steady-rest located close to the point where the actual cutting is done, thus supporting the work rigidly, and assuring accurate results—as well as large production.

Several large automobile manufacturers are obtaining almost unbelievable results on the Thread Generator—costs have, in several cases, been reduced more than three times.

Are you using Thread Generators?

THE FELLOWS GEAR SHAPER COMPANY

Head Office and Works: 78 River Street, Springfield, Vt., U. S. A.

Branch Office: 651 Book Building, Detroit, Mich.

Gear Shapers; Gear Shaper Cutters; Thread Generators; Gear-Tooth Grinders

Lockheed produces an INTERNAL Hydraulic Brake

Lockheed will soon dominate the internal brake situation, as it now dominates in the external field.

Its success in either case can be attributed to the superiority of hydraulic application over all other forms.

to be seen on the
New REO "Flying Cloud"

at the New York, Chicago and other
Automobile Shows

MAXIMUM MACHINABLE HARDNESS

Improving the Machinability of Iron with Nickel
Stepped Cylinder Test (White areas indicate white iron)

Machined entire length without regrinding tool

Required 3 tool grindings to machine down to $\frac{1}{8}$ " section; this section was white and un-machinable

Stepped cylinders similar to sketch were cast from the same 1.40% silicon iron, making the addition of Nickel in separate hand ladles. Fracture and Brinell hardness of the different sections of the cylinder are clearly indicated.

Grade "F" Nickel Makes HARD castings Machinable

EVERY experienced foundryman knows how to make a hard casting. But until recently, few foundrymen have known how to make a casting that is very hard and also readily machinable.

To secure machinability in a hard casting, Grade "F" Nickel should be added. This addition of Nickel is particularly desirable where it is necessary to secure greater machining production without the sacrifice of physical properties; hardness and wear-resistance. In short, Nickel extends the limitations of cast iron.

Our engineers have had extensive experience in solving foundry problems and will be glad to work with you towards securing "Maximum Machinable Hardness" in YOUR castings.

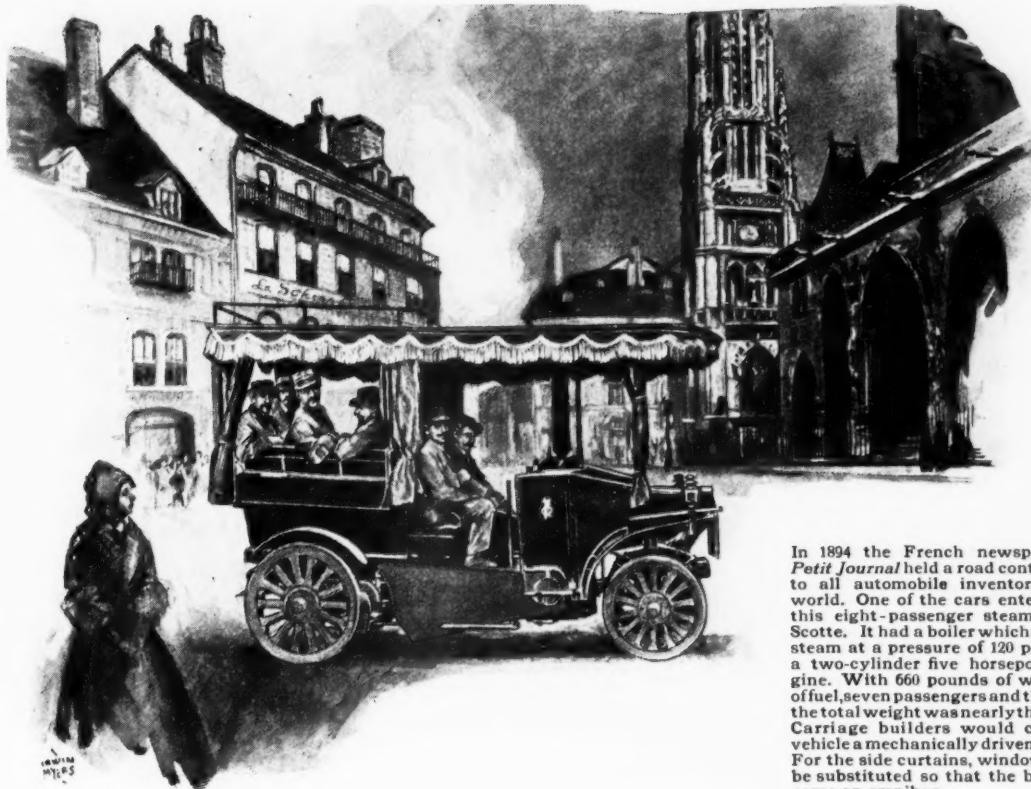
Subsequent advertisements in this publication will furnish additional information regarding "Maximum Machinable Hardness". Watch for them. Reprints of previous advertisements will be mailed on request.

1.	Finer grain	-
2.	Increased hardness	-
3.	Uniform hardness	-
4.	Increased strength	-
5.	Reduction of chill	-
6.	Increased hardness with decreased chill	-
7.	Better machinability with greater hardness	✓
8.	Greater strength with better machinability	-
9.	Stabilized machinability	-
10.	Increased wear-resistance	-

SEND FOR NICKEL CAST IRON
BULLETIN No. 202

N I N C K e I

THE INTERNATIONAL NICKEL COMPANY, 67 WALL STREET, NEW YORK CITY



In 1894 the French newspaper *Le Petit Journal* held a road contest open to all automobile inventors of the world. One of the cars entered was this eight-passenger steamer of J. Scotte. It had a boiler which supplied steam at a pressure of 120 pounds to a two-cylinder five horsepower engine. With 660 pounds of water, 440 offuel, seven passengers and the driver the total weight was nearly three tons. Carriage builders would call this vehicle a mechanically driven "brake." For the side curtains, windows could be substituted so that the brake became an omnibus.

SCOTTE'S steam carriage weighed about five thousand pounds exclusive of its seven passengers and driver. Contrast this with the huge 68-passenger modern coaches used on the boulevards of our large cities today.

Agathon Alloy Steels play an important part in the construction of modern coaches by providing increased carrying capacity with limited weight. Crankshafts, drive shafts, axles, steering mechanisms, springs and frames made of these super-steels have greater strength and increased resistance to wear, shock and strains.

Send for a copy of our Agathon Alloy Steel handbook.

Central Alloy Steel Corporation, Massillon, Ohio

CLEVELAND DETROIT CHICAGO NEW YORK ST. LOUIS
SYRACUSE PHILADELPHIA LOS ANGELES TULSA CINCINNATI



AGATHON ALLOY STEELS

NOTE: This is the 31st of a series of ads depicting the development of the Automobile. Watch for future ads.

27th Annual NATIONAL

Auto Shows

NEW YORK

Grand Central Palace
Jan. 8-15, 1927

CHICAGO

Coliseum
Jan. 29-Feb. 5, 1927

*The Latest and Best in Cars
The Newest in Accessories*

with two new features—

A light truck section
A shop equipment section

The Shop Equipment sections will be open to the trade only until 3 p. m.—except on the opening day. This will afford factory service managers, wholesale distributors, dealers and service station operators an opportunity to inspect in comfort the latest developments in service machinery and tools. In the late afternoon and evening the exhibits will be open to the public.

Trade Days

At the shows the Trade Days, inaugurated two years ago, will be in force again. On Monday and Tuesday at both shows the trade will be admitted until 1 p. m.

Tickets for Trade Days and Shop Equipment sessions will be supplied to all who are entitled to them, in advance and on application at the buildings.

Auspices of National Automobile Chamber of Commerce, Inc., with the cooperation of Motor Accessory Manufacturers Association

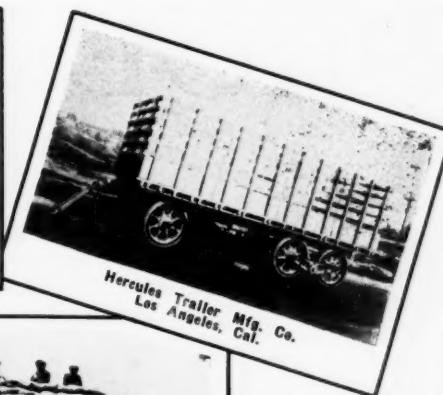
S. A. MILES, Manager
366 Madison Avenue
New York City



Weber Auto & Trailer Mfg. Co.
Los Angeles, Cal.



**Fageol Motors Company
Oakland, Cal.**



Hercules Trailer Mfg. Co.
Los Angeles, Cal.



Caterpillar Tractor Co.
Stockton, Cal.



Moreland Motor Truck Co.
Los Angeles, Cal.



Kimball Motor Truck Co.
Los Angeles, Cal.



Doane Motor Truck Co.
San Francisco, Cal.



**Denby Motor Truck Co.
Los Angeles, Cal.**



Utility Trailer Mfg. Co.
Los Angeles, Cal.

Pacific Coast Preference for Chrome-Vanadium Steel Springs

FOR a number of years, practically the entire spring production of United States Spring, Inc., Los Angeles, has been Chrome-Vanadium Steel. This large tonnage has gone into the chassis springs of the majority of motor trucks and trailers manufactured on the Pacific Coast.

Every automotive requirement is met by Chrome-Vanadium Spring Steel. It possesses great strength, unusual flexibility and high resistance to fatigue.

In addition, Chrome-Vanadium Spring Steel is more uniform in stress per inch of movement and permits of reduction in spring weight.

Write for complete data on Chrome-Vanadium Spring Steel.

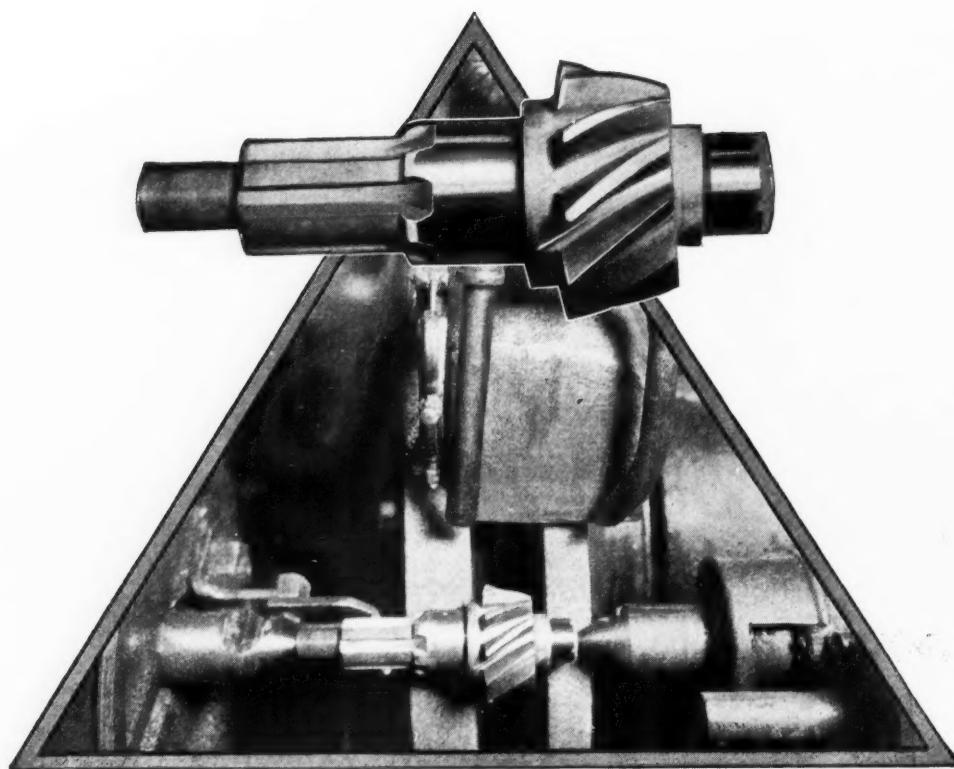
VANADIUM CORPORATION OF AMERICA

VANADIUM STEELS

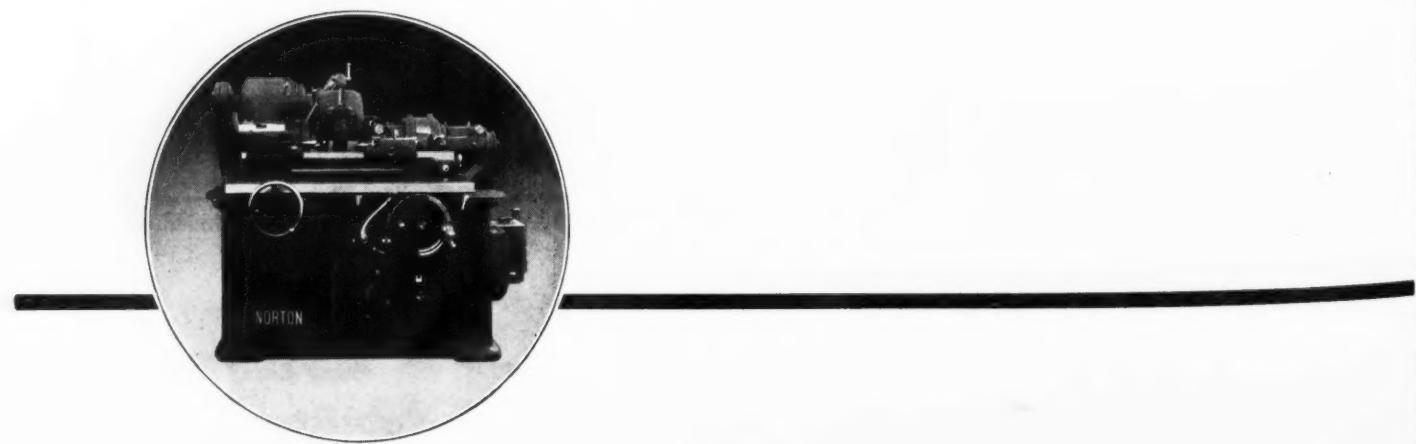
for strength, toughness and durability

PRODUCTION PRACTICE

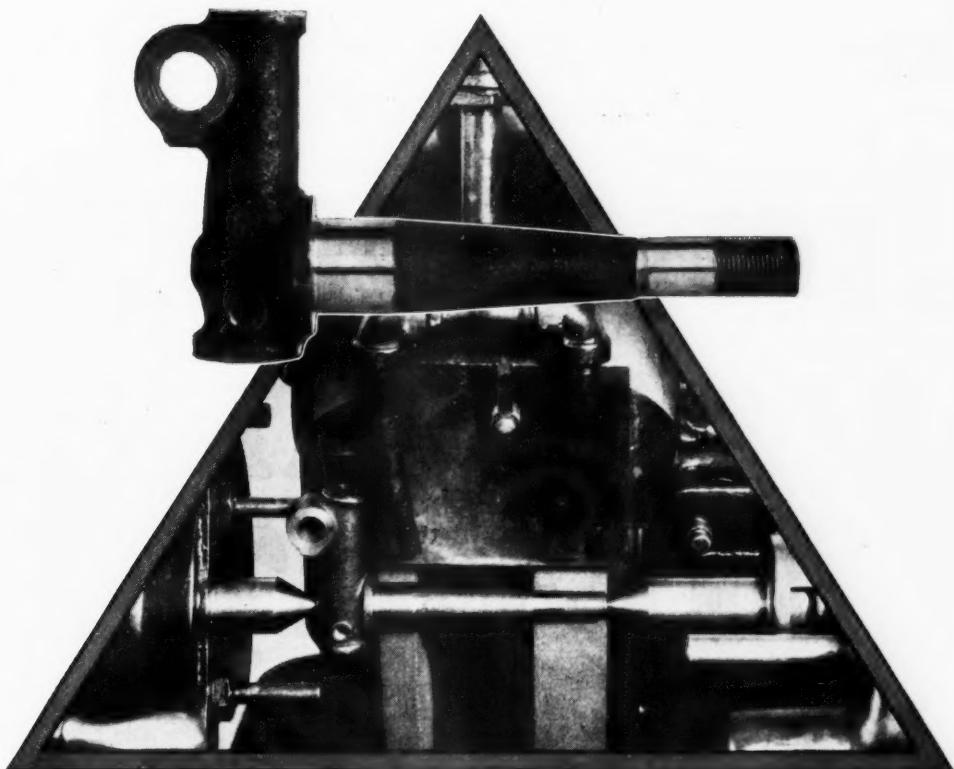
by TWIN WHEEL GRINDING



The part is a steel Drive Pinion $6\frac{1}{2}$ " long, ground on two diameters, 0.984" and 1.377", each to 0.0005" limit. The wheels are Norton 24CM Alundum.



PRACTICALLY DOUBLED STEEL GRINDING



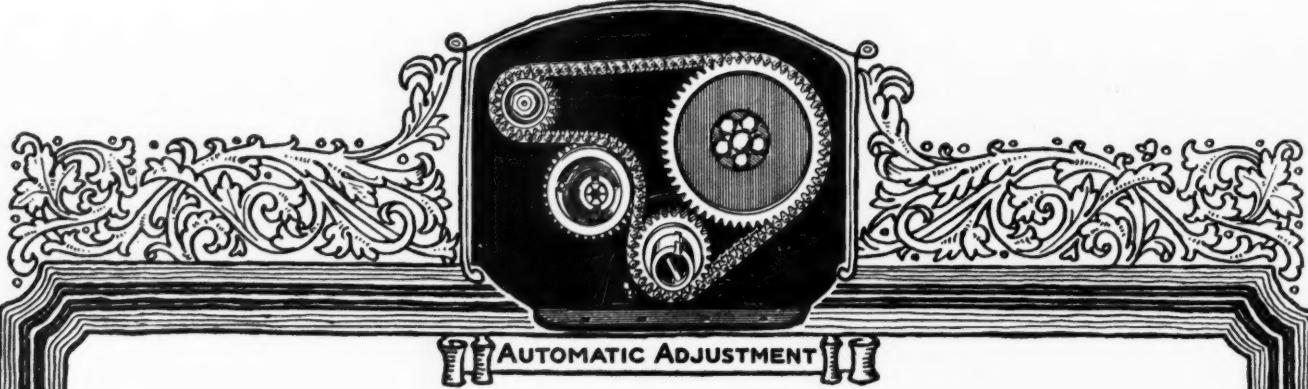
This Steering Knuckle is ground on two diameters, 0.749" and 1.189", and one shoulder. Size limit is 0.0005". The wheels are Norton 1924 CN Alundum.

NORTON COMPANY, WORCESTER, MASS.

New York Chicago Detroit Hartford
Philadelphia Cleveland Syracuse

NORTON
GRINDING MACHINES



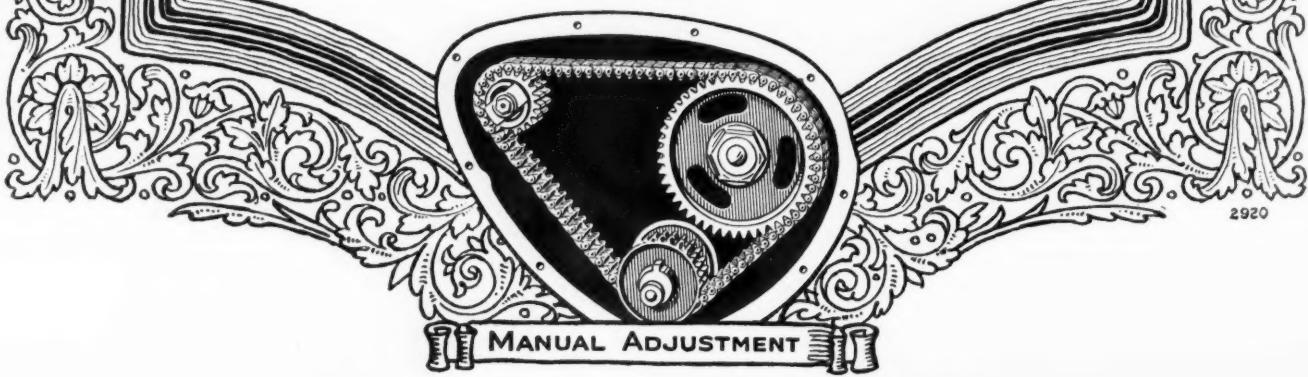


AUTOMATIC ADJUSTMENT

LINK-BELT AUTOMOTIVE SILENT TIMING CHAIN

Durable - Quiet - Reliable

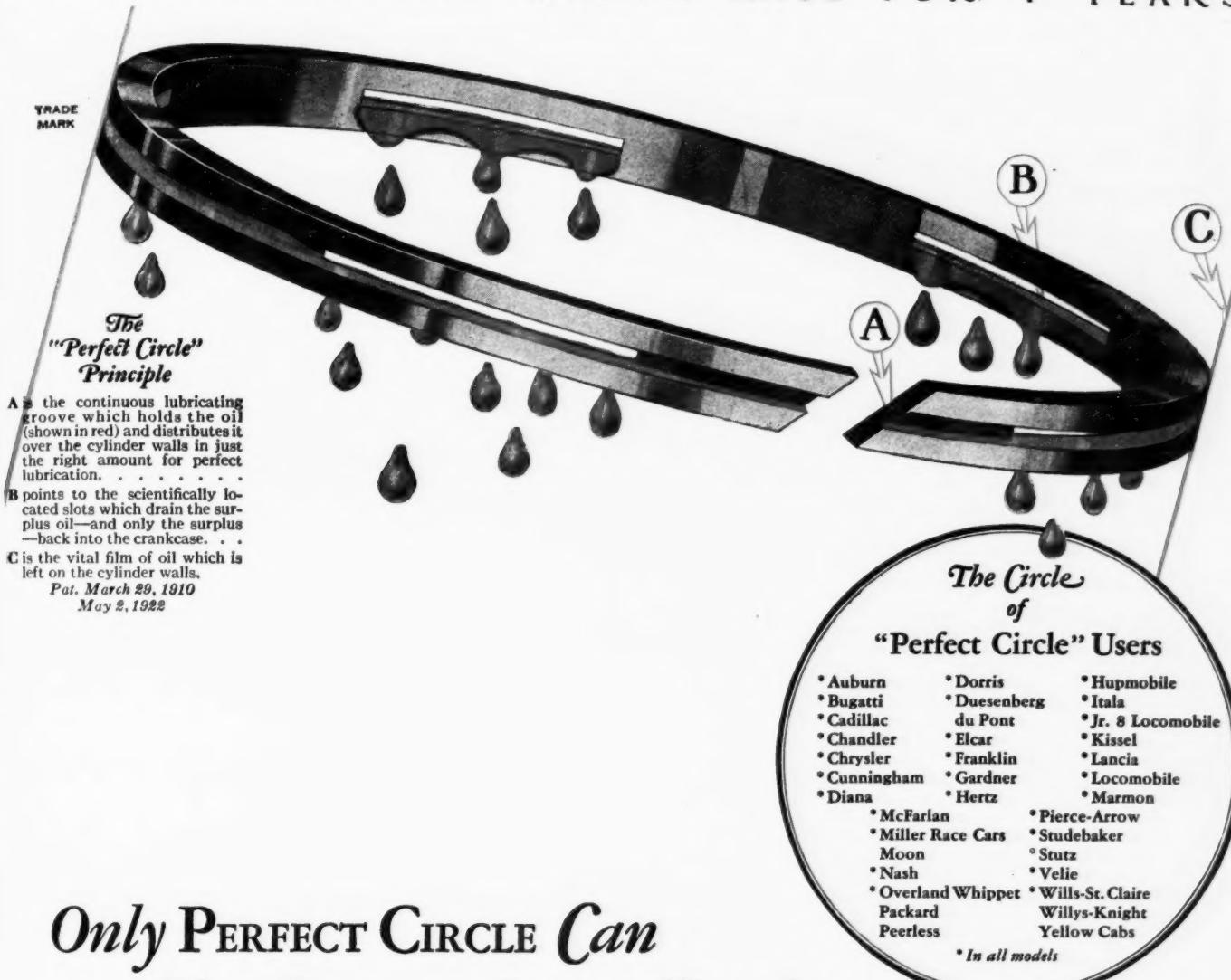
LINK-BELT COMPANY
INDIANAPOLIS
DETROIT



MANUAL ADJUSTMENT

2920

WINNER IN EVERY MAJOR RACE FOR 4 YEARS



Only PERFECT CIRCLE Can Give PERFECT CIRCLE Results

Oil-regulation can be obtained only by the PERFECT CIRCLE combination of a "lubricating groove on the face of the ring with the slots milled through." No other ring even approximates this construction.

PERFECT CIRCLES add 10,000 miles to the life of cylinders, pistons and rings, and make possible 1,000 or more miles to the gallon of oil. Only PERFECT CIRCLE can give PERFECT CIRCLE results because only PERFECT CIRCLES

regulate the oil scientifically, without scraping. Standard equipment in 140 cars, trucks and buses—winner in every major race for four years. Write today for samples and complete information.

THE PERFECT CIRCLE COMPANY, HAGERSTOWN, INDIANA

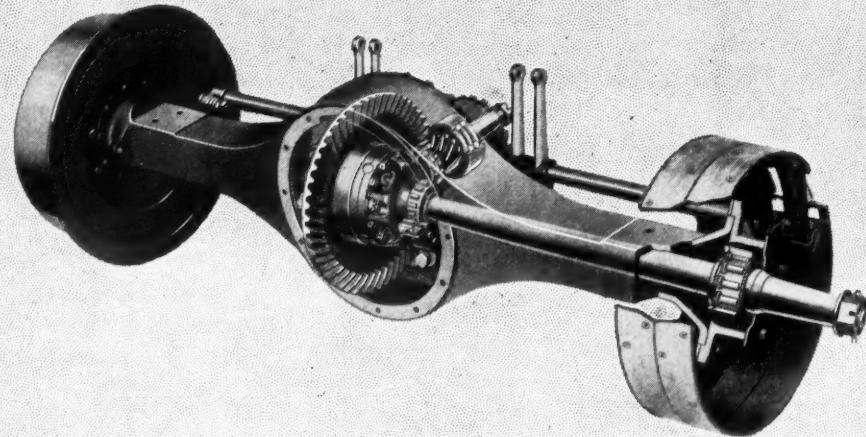
PERFECT CIRCLE Oil-Regulating Piston Rings



How It Works

The red shows the path of the oil—up the cylinder wall and into the continuous lubricating groove on the face of the ring, through the oil-draining slots in the ring, and then back into the crankcase through holes drilled in the piston behind the ring.

EATON AXLES



The axle shown here—Model 1002, for 1-ton trucks, Model 1502 for 1½-ton trucks—is the silent, spiral bevel gear drive. Rigid cast housing. Double internal brakes, fully enclosed. Straddle pinion mounting. Oversized chrome-molybdenum steel axle shafts mounted on double-thrust bearings.

THE name EATON on an axle is almost air-tight insurance for the owner against time out for axle repairs. That's the result of Eaton's skilled engineering, scientific selection of materials and painstaking workmanship.

THE EATON AXLE & SPRING COMPANY • CLEVELAND, OHIO



F. F. LANDIS

MARK H. LANDIS

Engineers - Inventors - Manufacturers

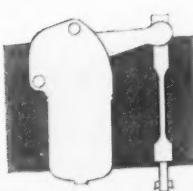
AFTER years of development work and testing under all conditions, the Landis Shock Diffuser is shortly to be announced.

The Landis Shock Diffuser is the invention and development of F. F. and Mark H. Landis, of long engineering and manufacturing standing.

In the opinion of engineers who have tested the Landis Shock Diffuser, it sets entirely new standards of easy riding. Its principle is new, utilizing TRUE HYDRAULIC RECOIL CONTROL to a degree never before attained.

You are invited to visit the Landis Booth at the New York Automobile Show. Booth D-151, 4th floor.

Landis Engineering & Manufacturing Company
Waynesboro, Pa.



FORECAST

1927 Statistical Issue

A Compendium of the industry and a hand book that will be valued and frequently consulted by men who build policies on the solid foundations of scientific fact.

Its circulation will include the executive heads of the industry, heads of banks and other financial organizations that are so closely tied up with automotive progress. As a vehicle for advertising it will present unusual merit and advantage. Hence you are invited to be a definite part of the issue.

Editorial Features

Our Industry Today

- a New cars sold—old cars scrapped.
- b Retail value of automotive products, estimated.
- c Average retail price of cars and trucks, 1916-1926.
- d Production capacity of automobile plants.
- e Car replacement sales, 1914-1927, estimated.

Retail Financing

- a Money invested in financing new and used car sales, retail and wholesale, 1924-1926.
- b Number of new and used car financed, 1924-1926.
- c Value of new and used car repossessions, 1924-1926.
- d Percentage financing losses to gross business, 1924-1926.

Special Marketing Data Section

- a Car sales per dealer by competitive price groups, by states in 1926.
- b 1926 car sales by competitive groups.
- c 1926 car sales by states, number and percentage.
- d Percentage of car agencies by competitive groups.
- e Ford and non-Ford dealers in towns of various sizes.
- f Car registrations by towns of various sizes.
- g Value of car sales by Ford and non-Ford dealer, 1922-1926.
- h Ford and non-Ford car registrations by years, 1914-1926. Chart and table.
- i Percentage of Ford and non-Ford dealers handling accessories.
- j Ford and non-Ford truck registration by states, as of January 1, 1927.
- k 1926 truck sales by states, number and percentage.
- l Percentage of non-Ford truck dealers in towns of various sizes.
- m Truck registrations by towns of various sizes.
- n Insert map showing: Car registration by states, percentage of all car dealers located in state, and car registration per dealer.
Beside map, number of car and truck dealers by states; Ford and non-Ford car registrations by states, as of January 1, 1927.

Highway Statistics

- a Growth of highway mileage and rural expenditures.
 - 1 Total mileage.
 - 2 Surfaced road mileage.
 - 3 Rural highway expenditures.
- b Total mileage, and mileage of surfaced roads outside of cities and towns.
 - 1 Miles of surfaced roads by states.
 - 2 Miles surfaced by states during calendar year.
- c Road mileage, road income and other related data.
- d Surfaced road mileage in foreign countries.

Production

- a Charts.
 - 1 Car truck and total production, 1913-1926.
 - 2 Car production by years and price class, 1913-1926.
 - 3 Car production by number of cylinders, 1926-1927.
 - 4 Per cent of Ford production to total, 1913-1926.
 - 5 Tire production, 1913-1926.
 - 6 Motorcycle production, 1913-1926.
 - 7 Truck production by capacities, 1924-1926.
 - 8 Tire production by types, 1925-1926.
 - 9 Monthly production, cars and trucks, 1924-1926.
 - 10 Open and closed car production, 1919-1926.
 - 11 Production of closed cars, phaetons and roadsters compared, 1926.
- b Tables.
 - 1 Passenger car and truck production, number and value, 1912-1926.
 - 2 Open and closed car production, actual and percentage, 1919-1926.
 - 3 Percentage closed car production by price classes, 1919-1926.
 - 4 Number and percentage of passenger car production by years and price classes, 1919-1926.

**AUTOMOTIVE
INDUSTRIES**

**9th Annual Statistical Issue
February 19, 1927**

FORECAST

1927 Statistical Issue

What it will mean to you and to every other industrial, financial and merchandising executive who has contributed to the present greatness of the automotive industry—and who are the underwriters of its future.

It will make no gesture toward indicating policies necessary to continued greatness, but will present, skillfully correlated, the facts and statistics upon which the men in executive positions may build their policies and further the successes of their individual enterprises.

Editorial Features

Production—*continued*

- 5 Foreign production by countries.
- 6 Number and percentage of truck production by capacities, 1923-1926.

Registrations

a Foreign tables.

- 1 World registrations by countries.
- 2 North and South American registrations by countries.
- 3 Asia registrations by countries.
- 4 African registrations by countries.
- 5 Oceania registrations by countries.
- 6 Summary of world registrations by continents.

Chart: How automobile use has grown outside the United States.

b Domestic tables.

- 1 Motor vehicle registration statistics by states.
- 2 Persons per motor vehicle, January 1, 1927.
- 3 Percentage gains in registrations by states, 1926.
- 4 Car and truck registration gains (actual), 1926.
- 5 Motorcycle registrations by states, 1920-1927.
- 6 Motor vehicle registrations in United States, by states, 1913-1927.
- 7 Cars and trucks in United States, by states, arranged in order of rank.

Chart: Growth of motor vehicle registrations 1915-1926.

Specifications

a Passenger car.

- 1 American chassis.
- 2 American engine.
- 3 American body.
- 4 American trend charts.
- 5 American export.
- 6 Continental.
- 7 British.

Specifications—*continued*

b Bus.

- 1 American chassis.
- 2 American body.
- 3 American trend charts.
- 4 British chassis.

c Truck.

- 1 American electric.
- 2 Gasoline rail car.
- 3 American trend charts.
- 4 American chassis.
- 5 Continental chassis.
- 6 British chassis.

d Tractor.

- 1 American farm.
- 2 American garden.

e American taxicab—American motorcycle.

f American stock engine.

g American stock rear axle, front axle, clutch and gearset.

h Aeronautical.

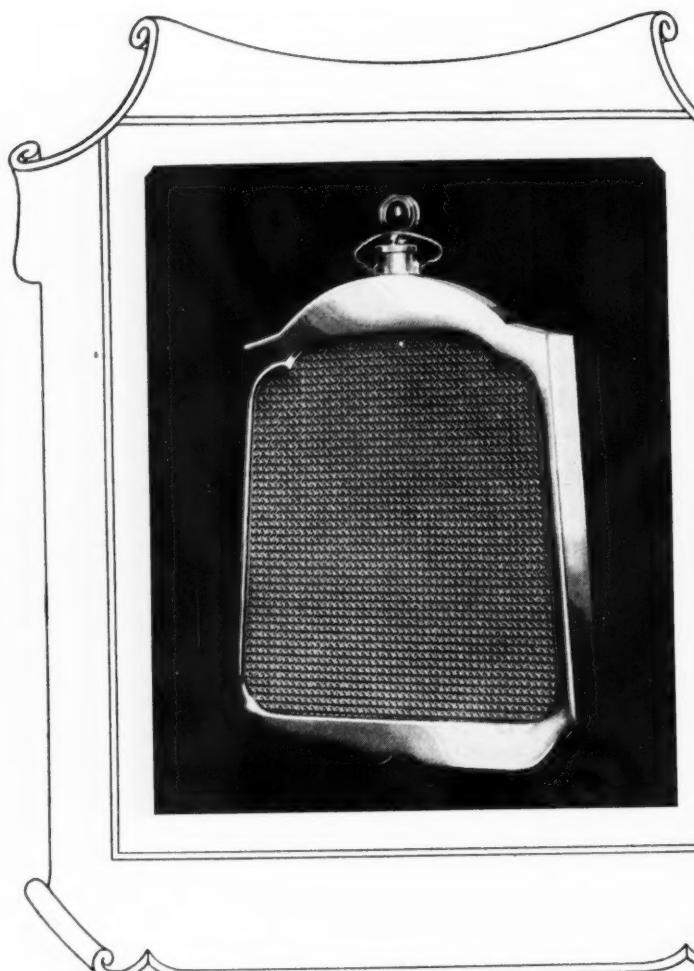
- 1 American and British aero engine.
- 2 American and foreign airplane.
- 3 Light airplane.
- 4 Stock steering gear.

i Exports.

- 1 Summary and trend story.
- 2 American car and truck.
- 3 American parts.
- 4 American tire.
- 5 Canadian car and truck.
- 6 Canadian parts.
- 7 French car and truck.
- 8 Italian car and truck.
- 9 British vehicle chassis.
- 10 British parts.
- 11 British car and truck.
- 12 American imports.
- 13 American airplane.
- 14 American electric vehicle.

9th Annual Statistical Issue
February 19, 1927

AUTOMOTIVE
INDUSTRIES



No industry has set a faster pace than the automotive and all credit to those pioneers who, gaining leadership, have held that coveted position.

CYCLE AND AUTOMOBILE TRADE JOURNAL 1904

Packard

Straight as an arrow through ten years of consistent progress can be traced the ceaseless pursuit of Perfection to its culmination in the "Packard 30"

Price, (in standard colors and equipment) \$4,200 f. o. b. Factory
 Special Colors, Upholstery and Equipment, Extra.
 Packard Motor Car Co., Dept. II
 Detroit, Mich.

Members Association of American Automobile Manufacturers

New York Branch
 1105 Broadway

DEVELOPMENT

The development of McCord over more than a quarter of a century is a reflection of the growth and development of the automotive industry.

MCCORD RADIATOR & MFG. CO.
 Detroit, Michigan

McCord



*"Do you mean
to say they are
actually stronger?"*

Men who know that the Empire New Process Bolt thread is as accurate as the thread of a hardened and ground gauge are sometimes astonished to find that the bolt is also *stronger* than the bolt with the ordinary thread. Yet by actual test Empire New Process Bolts show 20% greater strength.

**RUSSELL, BURDSALL & WARD
© BOLT & NUT COMPANY ©
PORT CHESTER, N.Y.**

Branch Office:
Straus Building
CHICAGO

Branch Office:
General Motors Bldg.
DETROIT

Branch Factory:
ROCK FALLS, ILL.

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169 Jackson Street
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Maydwell & Hartzell, Inc.
158-168 Eleventh Street
SAN FRANCISCO

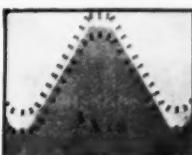
Makers of Bolts, Nuts and Rivets Since 1845

This explains the extra strength
—and also the uncanny accuracy.

The Empire New Process Bolt thread is produced by building up the thread on the bolt blank. No metal is cut away. Dies of marvelous precision form the thread so that on the comparator the profile is identical with that of a hardened and ground gauge thread.



*This is the thread profile
of a hardened and
ground gauge*



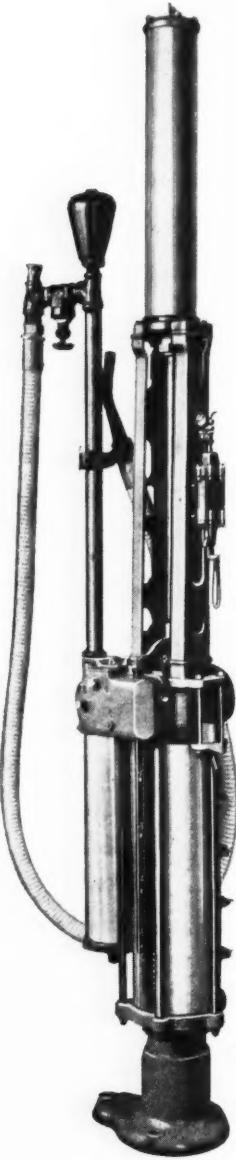
*And here is the thread profile
of an average Empire New Process Bolt*

This same method strengthens the steel instead of weakening it as in the ordinary method of threading.

EMPIRE *New Process* BOLTS

Bowser registering meter
high-speed—accurate

Gas and Oil at production line speed!

Speed Sentry 89
Fast—accurate—dependable

As cars come to the end of line, a Bowser combination system will give them fuel and oil—in one quick, easy, accurate operation.

2 gallons of gas and 6 quarts of oil; or 1 gallon of gas and $4\frac{1}{2}$ quarts of oil—it's all the same, this Bowser layout handles the job perfectly.

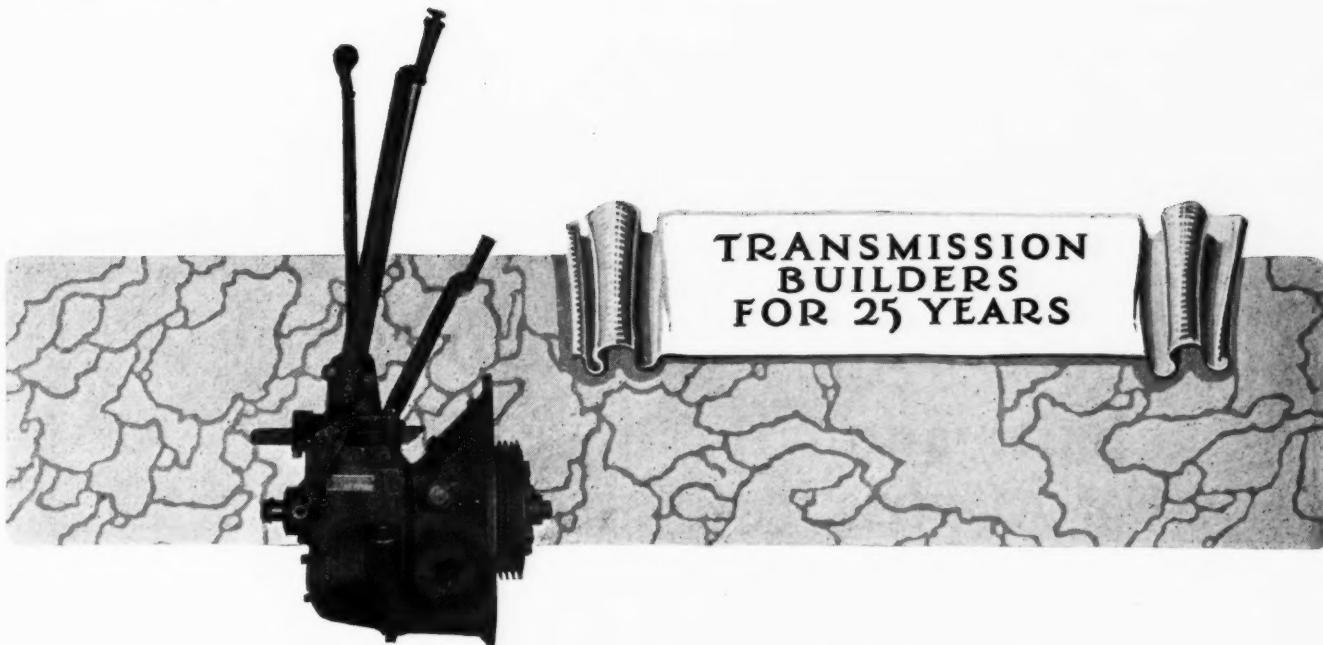
Exact record of deliveries, too, under lock and key—checkers can audit each pump's work.

Other complete storage and disbursing systems, with or without measuring pumps; departmental storage systems; machine shop cutting oil systems that continuously purify oils. These and many other liquid-handling systems are Bowser specialties.

Whatever your oil-handling problem, ask Bowser to help solve it. Address Dept. 31.

Bowser Storage
Saves waste—averts fire hazard

S.F. BOWSER & COMPANY, Inc.
LUBRICATION ENGINEERS AND MANUFACTURERS
FORT WAYNE, INDIANA. U.S.A.



An Infinite Variety of Speeds With Multiple Savings

The Model 2-SC Fuller Two-Speed Clutch, used with a 4-speed amid-ship Fuller Transmission, provides a multiple speed transmission equal to a 7-speed set-up.

The resultant first cost is less, the units are lighter and more accessible, and they provide greater flexibility.

There are many such ways in which the 25 years of Fuller experience have been turned to the advantage of users of Fuller Transmissions.

Most of these result in multiple savings, which start with first cost and continue indefinitely through production and dependability in service.

Decreased inventory is an important one!

Our engineers will
gladly confer with
yours whenever
transmissions are
being considered.

See our exhibit
at the
New York
Automobile
Show,
January 8-15

FULLER & SONS MFG. CO.
KALAMAZOO MICHIGAN

Member of Motor Truck Industries, Inc.

FULLER
TRANSMISSIONS

Over Three Million Passenger Car Bodies

built annually by readers
of AUTOMOTIVE INDUSTRIES

To do this they require:

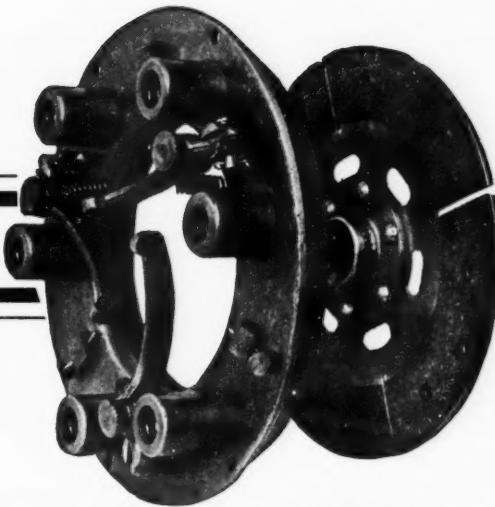
About 375,000 tons of sheet metal, close to 7 million pounds of curled hair and cushion stuffing material, approximately 50 million square feet of plate glass, over 15 million yards of upholstery fabrics, about 2½ million yards of carpet, over 3 million pounds of dry glue, about 3 billion screws and 85 million bolts, over a billion feet of lumber, upward of 5 million yards of artificial leather for closed car decks, close to 5 million gallons of liquid paint and varnish, about ten million pounds of white lead and dry paint and some two billion hardware units.

These are imposing figures which vendors of all body parts and materials will do well to consider. This market is reached most effectively by

Automotive Industries

Model 9-HH

For Passenger Cars



The ROCKFORD Clutch

Model 9-HH for passenger cars, Model 9C-1 for light commercial cars, is delivered at your factory ready for immediate installation. It needs no further adjustment.

It cuts production time and expense, gives improved service and is furnished at an attractive price to you.

It is a perfectly engineered and manufactured job—A NEW AND BETTER CLUTCH.

Ask our engineers for details

Rockford Drilling Machine Co.

Rockford

Illinois

IN THE UNITED STATES DISTRICT COURT—EASTERN DIVISION DISTRICT OF MISSOURI

Trustee's Bankruptcy Auction Sale

Dorris Motors Incorporated, Bankrupt

4100 Laclede Avenue, St. Louis

PURSUANT to an order of the Referee in Bankruptcy for the division and district indicated in the foregoing, and subject to approval thereby, we will sell for the undersigned Trustee, the Machinery, Tools, Fixtures, Equipment, Accessories, Parts, Material, Good-Will, Pat-

terns, Designs, Patents, Motor Buses, Passenger Cars, Trucks.

Likewise many and various other assets of this Bankrupt which were, until recently, utilized in the manufacture of Motor Buses, Passenger Cars and Trucks under the Trade Name of "DORRIS".

Inspection Days

Monday, January 10th, Tuesday, January 11th

9 A. M. to 5 P. M.

AT PUBLIC SALE FOR CASH

Wednesday, January 12th

(Beginning 10.30 A. M.)

The property will be sold in bulk and suitable detail lots.

For catalogue of property or further detailed information pertaining hereto, apply to any of the undersigned at St. Louis, Missouri.

Joseph M. Reardon, Trustee in Bankruptcy, Dorris Motors, Inc., Arcade Bldg., St. Louis

Richard O. Rumer, Counsel for Trustee, Arcade Bldg., St. Louis

BEN J. SELKIRK & SONS, AUCTIONEERS, 713½ CHESTNUT ST., ST. LOUIS

BLISS



Trusty Twins—

Each of these two Bliss No. 3½B Toggle Drawing Presses is making a record for speedy, accurate, and economical production. Every 9½-hour day, the one in the foreground cuts and draws 2500 steel covers for automobile gears, and the second press draws 4000 copper water jackets for automobile motors.

In the large family of Bliss Presses there are types that will perform similar highly economical service on your sheet metal operations.

BLISS for MACHINERY

E. W. BLISS CO.

Sales Offices DETROIT CLEVELAND CHICAGO PITTSBURGH CINCINNATI NEW HAVEN ROCHESTER PHILADELPHIA
Gen. Motors Bldg. Guarantee Title Bldg. London Guar. & Accident Bldg. Oliver Bldg. Union Trust Bldg. 2d National Bank Bldg. Times Union Bldg. Pennsylvania Bldg.

American Factories: BROOKLYN, N. Y. HASTINGS, MICH. SALEM, OHIO CLEVELAND, OHIO

Foreign Sales Offices and Factories:
ENGLAND: Pocock St., Blackfriars Rd., S. E., London. Norwich Union Chambers, Birmingham. FRANCE: 54 Blvd. Victor-Hugo, St. Ouen, Sur Seine, Paris.

MAIN OFFICE
AND WORKS

BROOKLYN, N. Y., U.S.A.

Some Sheet Metal Products

made with Bliss Presses

- Agricultural Implements
- Aluminum Ware
- Armature Disks and Segments
- Automobile Parts
- Bicycle Parts
- Bottle Caps and Capsules
- Brass Goods
- Brittania Ware
- Buckles
- Burners
- Butter Tins
- Cash Registers
- Cigarette Boxes
- Clocks
- Coal Hods
- Collapsible Tubes
- Cooking Utensils
- Cornice Work
- Cuspidors
- Cutlery
- Dental Instruments
- Dinner Pails
- Drip Pans
- Door Knobs
- Drop Forgings
- Electrical Goods
- Elevator Buckets
- Enamel Ware
- Expanded Metal Lath
- Fish Cans
- Fruit Cans
- Fry Pans

No. 425

WHERE reliability is of extreme importance, you'll usually find commercial and industrial motors cooled by Perfex Bronze-Core Radiators, known the world over for high quality. Our engineering staff offers you the background of over 16 years expert service in cooling motors.

RACINE RADIATOR COMPANY
Racine, Wisconsin

Pacific Coast Representative
ENGINEERING & SALES CO.
24 California Street, San Francisco, Calif.

PERFEX
THE PERFECT RADIATOR

Besides the many exhibits of Perfex cooled machines at the Chicago Road Show, Perfex Radiators will be displayed in a special exhibit at Space EB-9



This Commerce Truck is in for a good heavy load of wet sand, but big hauls make profit. Gas-powered, heavy-duty equipment is usually crowded up to its capacity, and that's when Perfex-cooling counts most. Commerce is one of a number of Perfex-cooled motor trucks.

For every special cooling problem as well as standard requirements our engineering staff of cooling specialists offer seasoned, practical experience in radiator design.



THE WM. D. GIBSON CO.
1800 Clybourn Ave. Chicago, Ill.

WE are ready to assist manufacturers in their
spring problems, and have at our command
40 years of experience and engineering knowledge
in wire spring manufacturing and design.

Our valuable CHART OF SPRING DESIGN
is also available and will be mailed to your engi-
neering department on request.

RAYMOND MANUFACTURING CO.
CORY, PENNSYLVANIA

RAYMOND SPRINGS
WIRE



Machining Combustion Chambers in Cylinder Heads 8 to 9 per Hour

Among the Users

Hupp, Studebaker, Packard, Oldsmobile Plants,
Chrysler, Rickenbacker, Paige

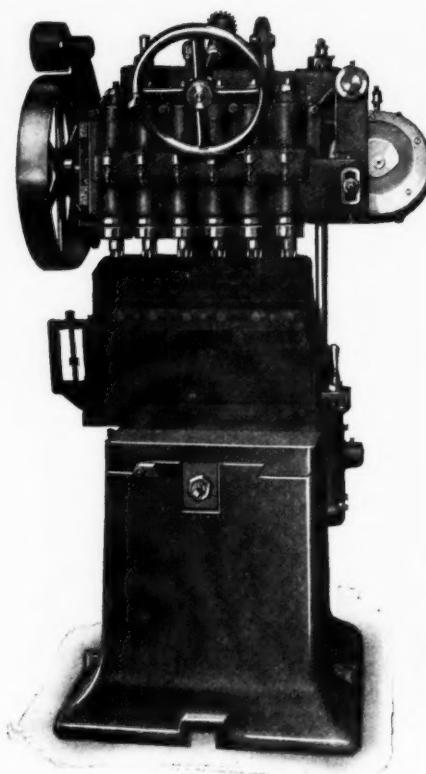
All the combustion chambers are machined in one operation, one setting on the Coulter Automatic Vertical Profiling Machine. Irregular surfaces or depressions impossible to machine on standard milling machines can be finished.

One complete cycle covers the entire surface—the machine stops automatically. Production time averages two to four minutes, floor to floor.

2, 3, 4, 6 and 8-spindle types. Let us send production figures on your work. Send us your blueprints.

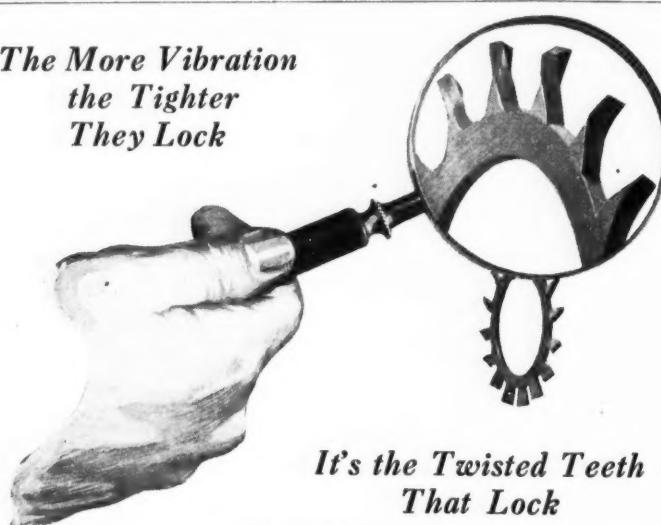
The Automatic Machine Co., Bridgeport, Conn.

Coulter Shaping Planer, Threading Lathe, Diamond Tool
Boring Machine and Thread Miller



C^{“A”}ULTER
VERTICAL PROFILING MACHINE

*The More Vibration
the Tighter
They Lock*



*It's the Twisted Teeth
That Lock*

twisted teeth—a series of multiple locks—biting into metal—getting tighter with vibration.

Then add the big feature of *non-tangling*, plus lighter weight, cleaner work, bolt lengths saved. Why not make a New Year's resolve now to write and ask for free quantity for your shop test? Such a test will prove more than we could say in many pages of advertising.

Sizes up to $1\frac{1}{8}$ inches



Type 11
External



Type 12
Internal



Type 16
Countersunk

A Practical New Year's Wish for Practical Production Men

Shakeproof wishes all of you the best of years ahead—and would like to help smooth the path of production.

Our practical wish is that you learn the better-production features of the Shakeproof Lock Washer. When you do, by test, you are going to thank us for this message.

In Nineteen Twenty-seven, you will have *no more loose connections* on work if you employ this modern and positive lock washer. Look under the magnifying glass at those

SHAKEPROOF LOCK WASHER COMPANY—Incorporated
2501 North Keeler Avenue **Chicago, Illinois**

What will the weather do to your car?

OF INTEREST to *MOTORISTS*
AUTOMOBILE SALES AGENTS
and *AUTOMOBILE*
MANUFACTURERS

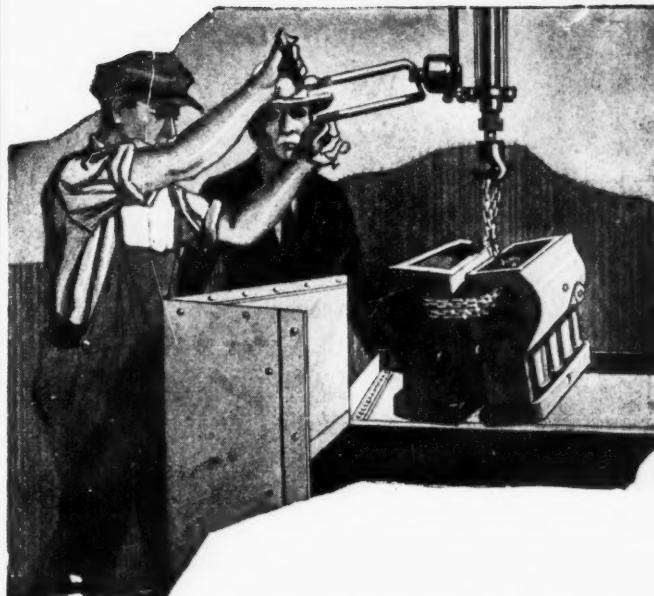
IT is not the appearance of a car in the salesroom that counts. The important question is, how will the car look after exposure to all kinds of weather?

Unless non-corrodible metal goes into the hardware, bad weather soon causes rusted fittings that rob your car of its attractive appearance.

Solid BRASS or BRONZE hardware never rusts and is a permanent asset to a car.

COPPER & BRASS
RESEARCH ASSOCIATION

25 Broadway — New York



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THE cost of a cleaning operation is usually dependent on the materials and method used. To choose these correctly for a particular class of work requires the same careful analysis of conditions as demanded by any other manufacturing problem in a plant.

If you are interested in lowering unit cost of cleaning, here is a suggestion that will help you as it has over 18,000 concerns in more than 300 different lines of industry.

Let one of our Oakite service men study your cleaning operations. Let him prescribe the proper Oakite methods precisely suited to your work, and you will benefit in the same way as you would by adopting the Taylor system of "standardized tasks" to your other planned factory operations—simplified handling, uninterrupted production, improved quality, fewer rejects, lower costs.

Get in touch with us NOW, or write for booklets that pertain to your work. No obligation.

OAKITE IS MANUFACTURED BY

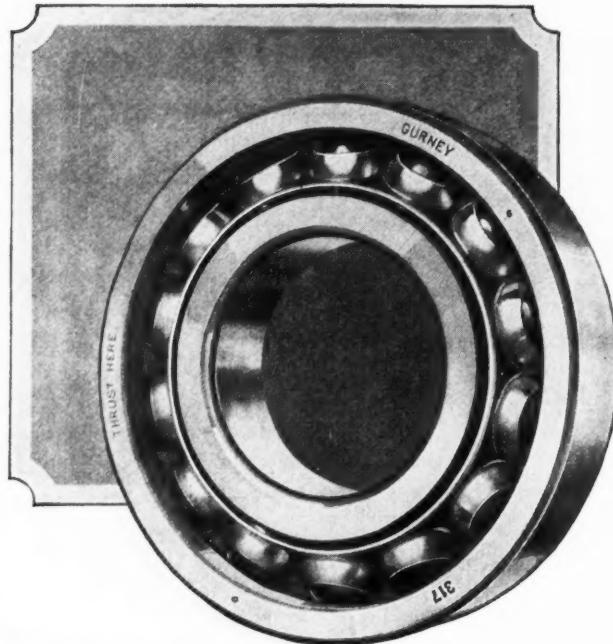
OAKITE PRODUCTS, Inc., 28 Thames St., NEW YORK, N.Y.

(Formerly OAKLEY CHEMICAL CO.)

Oakite Service Men, cleaning specialists, are located at:
Albany, Allentown, Pa.; Atlanta, Ga.; Baltimore, *Boston, Bridgeport, *Brooklyn, Buffalo, Camden, Charlotte, N. C.; *Chicago, *Cincinnati, *Cleveland, *Columbus, Ohio; *Dallas, *Davenport, *Dayton, *Denver, *Des Moines, *Detroit, Erie, Flint, Mich.; Fresno, Calif.; *Grand Rapids, Harrisburg, Hartford, *Indianapolis, Jacksonville, Fla.; *Kansas City, *Los Angeles, Louisville, Ky.; *Milwaukee, *Minneapolis, *Montreal, Newark, Newburg, N. Y.; New Haven, *New York, *Oakland, Calif.; *Omaha, Neb.; Philadelphia, *Pittsburgh, Portland, Me.; *Portland, Ore.; Providence, Reading, *Rochester, Rockford, Rock Island, *San Francisco, *Seattle, *St. Louis, South Bend, Ind.; Springfield, Ill.; Syracuse, *Toledo, *Toronto, *Tulsa, Okla.; Utica, Vancouver, B. C.; Williamsport, Pa.; Worcester.

*Stocks of Oakite materials are carried in these cities.

OAKITE
TRADE MARK REG U.S. PAT OFF
Industrial Cleaning Materials and Methods

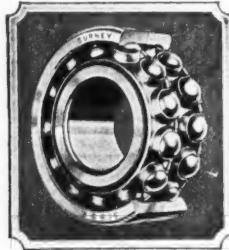


Better Bearings for every automotive use!



Molybdenum Steel Balls are now used in all types of Gurney Ball Bearings. This increases their capacities even more than during the past 24 years, during which time they have been rated higher than all other bearings.

New Data Sheets — just issued — will give you complete information. Write.



MARLIN-ROCKWELL CORP.
Gurney Ball Bearing Division
JAMESTOWN, N. Y.

(18357)

GURNEY BALL BEARINGS

Leadership

*MARSHALL SPRINGS—in the Best Beds—
in the Best Furniture—in the Best Automobiles*



A quarter century of zealous endeavor has established Genuine Marshall Cushion Springs as the unmistakable leader.

Discriminating car manufacturers recognize in Genuine Marshall Cushion Springs the highest achievement in supplying unusual durability and unalloyed comfort.

And this leadership is intensified by an unconditional guarantee for the life of the car in which they are placed.

J.W. Gurney

President

NATIONAL SPRING & WIRE CO.

Grand Rapids, Michigan

Detroit Office: General Motors Building

Genuine!
Marshall
Cushion Comfort Springs

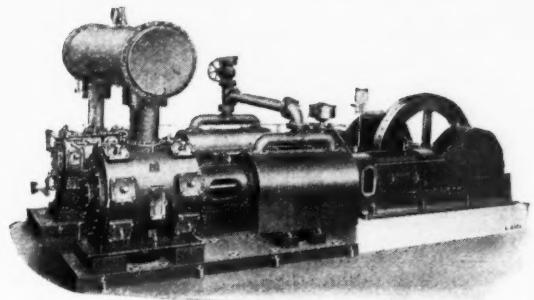
*Sheeting
or
Burlap*

WORTHINGTON



UNAFLOW FEATHER (REG. U.S. PAT. OFF.)

VALVE COMPRESSORS

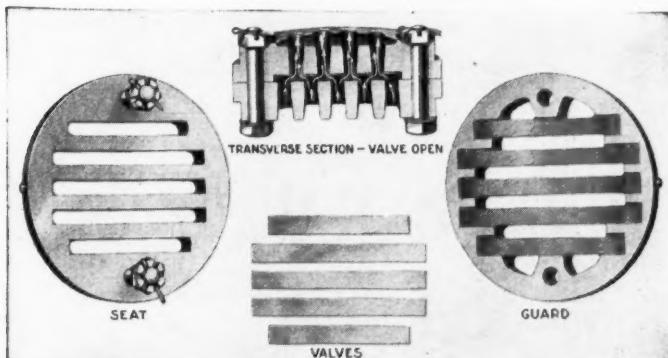


THE Unaflow steam cylinder, by its remarkable adaptability to high steam pressure and super-heat, has brought about marked economies in the small steam engine.

Worthington has adapted this economical steam cylinder to the well known FEATHER Valve Compressor, for service where steam drive is required. This combines in one unit, the highest development in reciprocating steam engines with the utmost in compressor design.

The phenomenal success of Worthington compressors is largely due to the use of FEATHER Valves. These valves seat by contact—not by destructive impact. The action, while smooth, gives a large opening for the passage of air, thus effectively reducing "wire drawing." The average life of the valves, under continuous service, is three years. Even after this long period, replacement costs but a few cents and requires very little time. Bulletin 6-L-542 on request.

Compressors Oil and Gas Engines Pumps
Condensers Feedwater Heaters
Oil and Water Meters



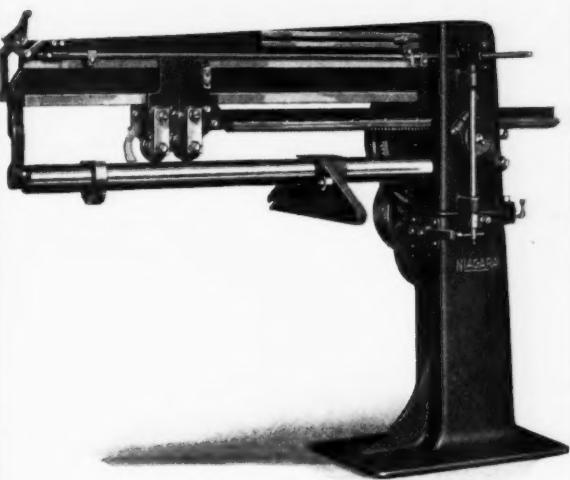
Transverse section and dis-assembled view of FEATHER Valve

6731-13 (12)

WORTHINGTON PUMP AND MACHINERY CORPORATION
115 BROADWAY, NEW YORK CITY

BRANCHES IN 24 CITIES

Sheet Metal Working Machines, Tools, Dies



*Working lengths up to 10 feet.
Capacities up to 16 gauge*

Power Groovers

Have you sheet metal cylinders or pipes on which seams—outside or inside—must be grooved and flattened?

You can better the quality and increase the quantity of your production with Niagara Power Machines.

Write or sketch your work and we will send information on the correct and economical groover.

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NIAGARA

"DETROIT" TIRE CARRIER

NO STRAPS OR CHAINS TO CHAFE THE TIRES



STANDARD EQUIPMENT ON MAJORITY OF
AMERICA'S BETTER CARS

DETROIT CARRIER & MFG. CO.

DETROIT, U. S. A.



The leadership of
Mather Springs has
been attained
through a fixed
policy, formulated
years ago, to build
the world's finest
original equip-
ment springs.

THE MATHER SPRING CO., TOLEDO, OHIO

CARPENTER CARPALOY

Corrosion-Resisting
Steels



CARPALOY No. 1
(Stainless Iron)

CARPALOY No. 2
(Stainless Steel)

CARPALOY No. 3
(Rustless Steel)

In billets, hot-rolled bars, rings, discs,
forgings, strips, cold-rolled and cold-
drawn bars, polished drill-rods, etc.

Circular on Request

THE CARPENTER STEEL COMPANY
READING, PA.



WRIGHT
HIGH SPEED
HOIST UNIT

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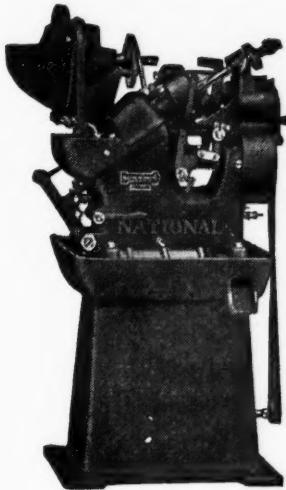
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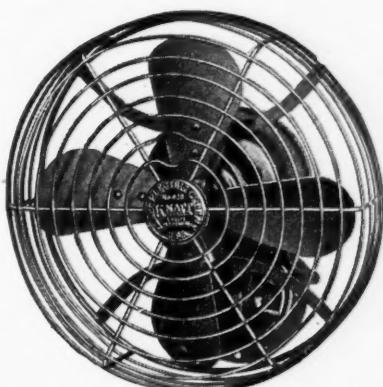
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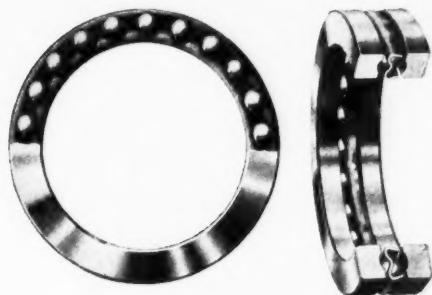
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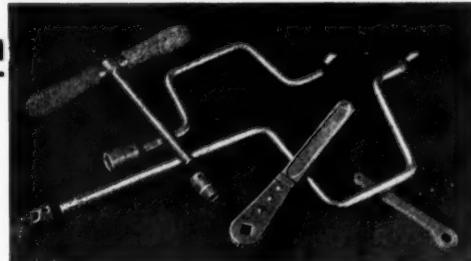
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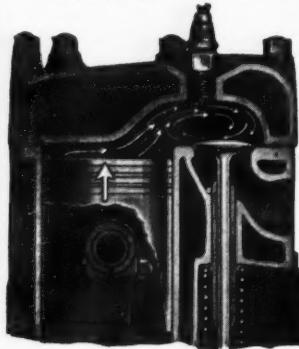
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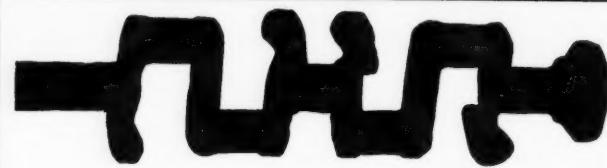
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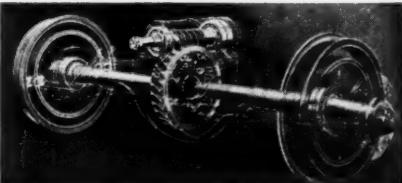
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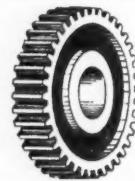
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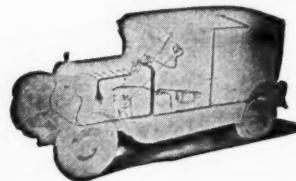
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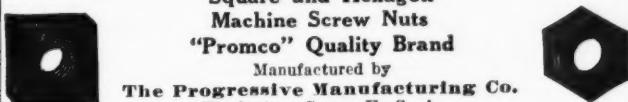
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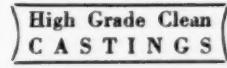
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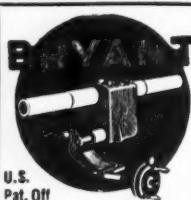
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Ahlberg Bearing Co.	Copper & Brass Research Asso.	Covers, Housing	Fans Ceiling	Cylindrical
Bearings Co. of America	Stewart Die Casting Corp.	Bossert Corp.	Knapp Electric Corp.	Fitchburg Grinding Machine Co.
Marlin-Rockwell Corp.	Bronze	Crankshafts	Felt	Foote-Burt Co.
McGill Metal Co.	Copper & Brass Research Asso.	Canton Forge & Axle Co.	American Felt Company	Heald Machine Co.
New Departure Mfg. Co.	Stewart Die Casting Corp.	Park Drop Forge Co.	Western Felt Works	Landis Tool Co.
Strom Bearings Co.	Die	Wyman-Gordon Co.	Fenders	Norton Co.
Plain	Franklin Die - Casting Corp.	Cups, Lubricating	York Corrugating Co.	Internal
Franklin Die - Casting Corp.	McGill Metal Company	Link-Belt Co.	Egyptian Lacquer Mfg. Co.	Bryant Chucking Grinder Co.
Stewart Die Casting Corp.	Soss Mfg. Co.	Cutters and Hobs	Filler, Lacquer	Heald Machine Co.
Blanks, Metal	Stewart Die Casting Corp.	Brown & Sharpe Mfg. Co.	Egyptian Lacquer Mfg. Co.	Surface
Link-Belt Co.	Malleable	Cutters, Gear	Filters, Air	Abrasive Mach. Tool Co.
Blue Printing Machinery	Erie Malleable Iron & Steel Co.	Fellows Gear Shaper Co.	Rectifier Mfg. Co.	Bryant Chucking Grinder Co.
Pease Co., C. F.	Link-Belt Co.	Cutters, Keyway	Filters, Oil	Fitchburg Grinding Machine Co.
Bodies	Temple Malleable Iron & Steel Co.	Lapointe Co., J. N.	Rectifier Mfg. Co.	Heald Machine Co.
Budd Mfg. Co., E. G.	Steel	Die-Castings	Finishes	Universal
Mullins Body Corp.	Link-Belt Co.	Franklin Die - Casting Corp.	Armitage & Co., John L.	Landis Tool Co.
Bolt & Nut Machinery	Chains	McGill Metal Company	Berry Bros.	Norton Co.
National Machinery Co.	Link-Belt Co.	Soss Mfg. Co.	Egyptian Lacquer Mfg. Co.	Value Seat
Bolts and Nuts	Link-Belt Co.	Stewart Die Casting Corp.	Valentine & Co.	Fitchburg Grinding Machine Co.
Buffalo Bolt Company	Channels, Glass	Dies	Flywheels	Foote-Burt Co.
Russel, Burdsall & Ward Bolt & Nut Co.	American Felt Co.	Greenfield Tap & Die Corp.	Carnegie Steel Co.	Grinding Wheels
Boring Machines	Western Felt Works	Niagara Mach. & Tool Works	Forging Machinery	Norton Company
Bullard Mach. Tool Co.	Chemicals, Rust Removing and Preventing	Discs, Clutch	Bliss Co., E. W.	Gunglaze
Foote-Burt Co.	American Chemical Paint Co.	Bossert Co.	National Machinery Co.	Valentine & Co.
Rockford Drilling Machine Co.	Chucking Machines	Drafting Room Accessories	Forgings	Hammers
Konigslow Mfg. Co., Otto	Bullard Machine Tool Co.	Pease Co., C. F.	Canton Forge & Axle Co.	Chambersburg Engineering Co.
Brake Bands	Chucks, Magnetic	Draftsman's Supplies	Ladish Drop Forge Co.	Handles, Door
Bossert Corp.	Heald Machine Co.	Pease Co., C. F.	Park Drop Forge Co.	Mt. Carmel Mfg. Co.
Carnegie Steel Co.	Cleaners	Drawing & Surveying Instruments	Wyman-Gordon Co.	Handling and Measuring Systems
Brakes, Hydraulic	Air	Pease Co., C. F.	Tite-Flex Metal Hose Co.	Bowser Co., S. F.
Hydraulic Brake Co.	Drying Systems, Inc.	Drilling Machines	Gaskets, Copper Asbestos, Cork and Metallic Asbestos	Hangers
Brass	Rectifier Air Cleaner Co.	Edlund Machinery Co.	McCord Radiator Mfg. Co.	New Departure Mfg. Co.
Copper & Brass Research Asso.	United Air Cleaner Co.	Foote-Burt Co.	Gaskets, Felt	
Broach Grinding Machine	Anti-Rust	Rockford Drilling Machine Co.	American Felt Co.	
Lapoine Co., J. N.	American Chemical Paint Co.	Automatic	Western Felt Works	
Bronzes	Oakite Products, Inc.	Rockford Drilling Machine Co.	Gauges	
Copper & Brass Research Asso.	Metal	Bench	Rectifier Mfg. Co.	
Bumpers	Ford Co., J. B.	Rockford Drilling Machine Co.	Gear Cutting Machines	
Bossert Corp.	Oakite Products, Inc.	Gang	Brown & Sharpe Mfg. Co.	
Eaton Axle & Spring Service Co.	Waste	Rockford Drilling Machine Co.	Gear Material	
Burlap	Oakite Products, Inc.	Heavy Duty	Bakelite Corp.	
National Spring & Wire Co.	Clutches	Foote-Burt Co.	Gear Testing Machines	
	Rockford Drilling Mach. Co.	Multiple Spindle	Fellows Gear Shaper Co.	
		Edlund Machinery Co.	Gears, Metallic	
		Foote-Burt Co.	Canton Forge & Axle Co.	
			Link-Belt Co.	

Housings, Axle Bossert Corp.	Office Space Cushman and Wakefield, Inc.	Sand Surfers Zapon Co.	Balls Waterbury Steel Ball Co.	Transmissions Fuller & Sons Mfg. Co. Van Dorn & Dutton Co.
Hydraulic Machines Lapointe Co., J. N.	Ovens, Baking Drying Systems, Inc.	Screen, Wire National Spring & Wire Co.	Bands and Hoops Carnegie Steel Co.	Tubes, Axle Pittsburgh Steel Products Co.
Ignition Electric Auto Lite Corp.	Pads, Felt American Felt Works Western Felt Works	Screw Machine Products Shimer, Samuel J. & Sons	Bars Carnegie Steel Co.	Tubes, Seamless Steel Pittsburgh Steel Products Co.
Ignition Systems Robert Bosch Magneto Co., Inc.	Paints Armitage & Co., John L. Berry Bros. Egyptian Lacquer Mfg. Co. Valentine & Co.	Screw Machines Brown & Sharpe Mfg. Co.	Billets Columbia Steel Co.	Tubes, Steering Column Pittsburgh Steel Products Co.
Insulation Bakelite Corporation	Paints, Manifold American Chemical Paint Co.	Screws, Drive Parker-Kalon Corp.	Blanks, Rolled Carnegie Steel Co.	Tubes, Torque Pittsburgh Steel Products Co.
Joints, Universal Mechanics Machine Co.	Parts, Pressed Metal Acklin Stamping Co.	Screws, Lag Buffalo Bolt Co.	Corrosion-Resisting Carpenter Steel Co.	Tubing, Flexible and Metal Tite-Flex Metal Hose Co.
Lacquer Armitage & Co., John L. Berry Bros. Egyptian Lacquer Mfg. Co. Valentine & Company Zapon Co.	Pickling Compound American Chemical Paint Co.	Screws, Set Shimer, Samuel J. & Sons	Deep Drawn American Sheet & Tin Plate Co. Columbia Steel Co.	Varnishes Armitage & Co., John L. Berry Bros. Egyptian Lacquer Mfg. Co. Valentine & Co.
Lathe Attachments Seneca Falls Mach. Co.	Pipes, Exhaust Powell Muffler Co.	Screws, Sheet Metal and Self-Tapping Parker-Kalon Corp.	Electric Furnace Central Alloy Steel Corp.	Ventilators Rectifier Mfg. Co.
Lathes <i>Automatic</i> Seneca Falls Mach. Co. Sunstrand Mach. Tool Co.	Piston Rings Duroseal Corp. Perfect Circle Co.	Shafts, Transmission Van Dorn & Dutton Co.	High Speed Carpenter Steel Co.	Washers American Felt Co. Gibson Co., Wm. D. Mansfield Lock Washer Co.
<i>Automatic Chucking</i> Bullard Mach. Tool Co.	Pistons Deluxe Products Corp. Duroseal Corp.	Shaping and Planing Machines Automatic Machine Co.	Long Terne American Sheet & Tin Plate Co.	<i>Raymond Mfg. Co.</i> Shakeproof Lock Washer Mfg. Co. Western Felt Works
<i>Axle Turning</i> Seneca Falls Mach. Co.	Power Plants, Industrial Waukesha Motor Co.	Shears Bliss Co., E. W. Niagara Mach. & Tool Works	Shafting New Departure Mfg. Co.	Welders, Electric Federal Machine & Welder Co. Taylor Welder Co. Thomson Elec. Welding Co.
<i>Crankshaft Turning</i> Seneca Falls Mach. Co.	Presses Bliss Co., E. W. Niagara Mach. & Tool Works	Sheet Metal Machines Bliss Co., E. W. Cleveland Punch & Shear Co.	Sheets American Sheet & Tin Plate Co. Central Alloy Steel Co. Columbia Steel Co.	Wheels American Steel & Wire Co. Budd Wheel Co. Erie Malleable Iron Co. Motor Wheel Corp. Van Wheel Corp. York Corrugating Co.
<i>Engine</i> Seneca Falls Mach. Co.	Primers (Lacquer) Egyptian Lacquer Mfg. Co.	Shock Absorbers Landis Eng. & Mfg. Co.	Stainless Central Alloy Steel Corp.	Wicks, Felt American Felt Co. Western Felt Co.
<i>Multiple Spindle</i> Bullard Mach. Tool Co.	Pumps Rectifier Mfg. Co. Worthington Pump & Machinery Co.	Spark Plugs Robt. Bosch Magneto Co., Inc.	Strip American Steel & Wire Co. Central Alloy Steel Corp. Columbia Steel Co.	Wire and Cable American Steel & Wire Co. Boston Insulated Wire & Cable Co. Packard Electric Co.
<i>Vertical Turret</i> Bullard Mach. Tool Co.	Punches Niagara Mach. & Tool Works	Special Machinery Bliss Co., E. W. Giddings & Lewis Mach. Tool Co.	Steering Arms and Knuckles Canton Forge & Axle Co.	Wire Mesh, Woven National Spring & Wire Co.
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Locks Detroit Carrier & Mfg. Co. Mansfield Lock & Washer Co.	Reamers, Speed-up Stevens Walden-Worcester, Inc.	Leaf Eaton Axle & Spring Service Co. Mather Spring Co.	Tank Support Straps Konigslow Mfg. Co., Otto	Wood Working Machinery Crescent Machine Co.
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Lubricators, Chassis McCord Radiator Mfg. Co.	Regrinding Machines Norton Co.	Removers, Enamel and Paint American Chemical Paint Co. Oakite Products, Inc.	Tanks, Oxygen Linde Air Products Co.	Worm Gear Reduction Units Cleveland Worm & Gear Co.
Lugs Shakeproof Lock Washer Mfg. Co.	Retainers Bearings Co. of America	Stampings Acklin Stamping Co. American Sheet & Tin Plate Co. Bossert Corp. Columbia Steel Co. Gibson Co., Wm. D. Konigslow Mfg. Co., Otto	Taps Greenfield Tap & Die Corp.	Wrenches Stevens Walden-Worcester, Inc.
Machine Screws Progressive Mfg. Co.	Rivets Progressive Mfg. Co. Russell, Burdsall & Ward Bolt & Nut Co.	Rods International Nickel Co.	Tees, Body Carpenter Steel Co.	
Machine Work (General) Konigslow Mfg. Co., Otto	Riveting Machines High Speed Hammer Co. Taylor Welder Co.	Starters Electric Auto Lite Corp. North East Elec. Co.	Terminals, Locking and Wire Shakeproof Lock Washer Mfg. Co.	
Magnetics Robert Bosch Magneto Co., Inc.	Rolling Mills Bliss Co., E. W.	Steel Alloy Carpenter Steel Co. Central Alloy Steel Corp.	Thread Generating Cutters Fellows Gear Shaper Co.	
Milling Machines Automatic Machine Co. Brown & Sharpe Mfg. Co. Rockford Drilling Machine Co. Sunstrand Mach. Tool Co.	Rust Removers and Preventers American Chemical Paint Co. Oakite Products, Inc.		Thread Grinding Machines Automatic Machine Co.	
<i>Hob Thread</i> Automatic Machine Co.			Threading Machines Grant Mfg. & Mach. Co.	
Mufflers Powell Muffler Co.			Tire Locks Detroit Carrier & Mfg. Co.	
Nickel International Nickel Co.			Tools, Small Brown & Sharpe Mfg. Co.	

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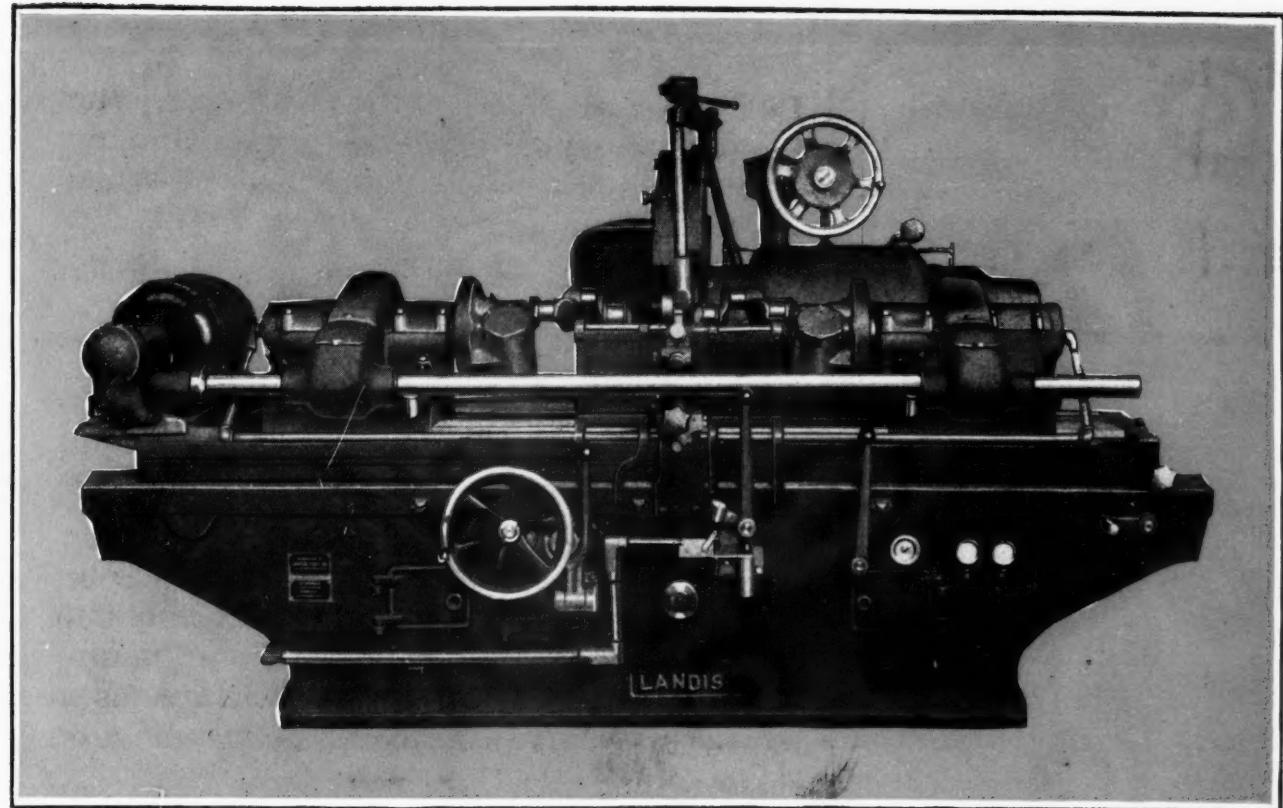
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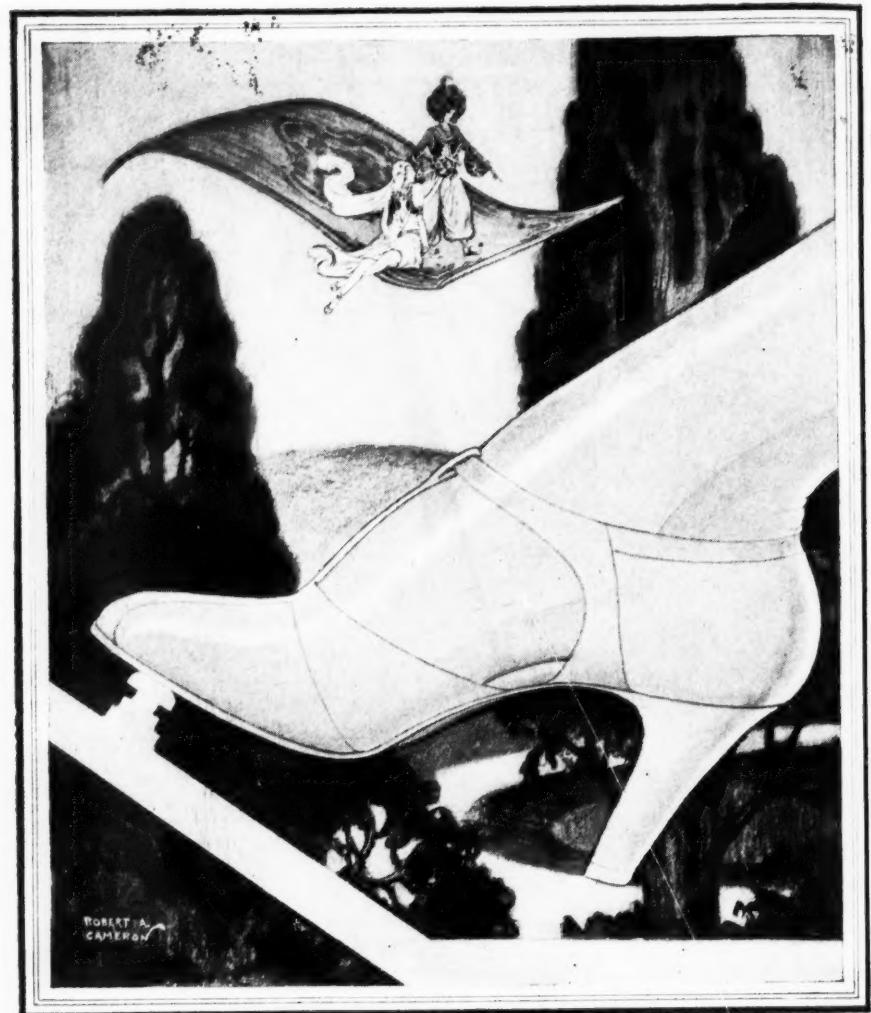


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